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Nurseries and Nature

Does Nature have an Influence on
Children's Motor Development?

Abstract

This MPH thesis covers a research study done in Reykjavik, Iceland in 2009 - 2010. The purpose of the thesis is to discover if children that attend nurseries with unspoiled nature as a part of the playground area, have better motor development than children that do not have access to nature on a regular basis. Five nurseries participated in the research. Two served as a treatment group and three as a control group. Data was gathered with a motor development test in August 2009 and again in June 2010. The data was analyzed with the help of the SPSS program. The result of this research is that there is a difference between the groups, on testing days, in favor of the treatment group. But the treatment group does not gain more advantages during the time between tests. This research also indicates that there is no significant difference according to Gender or birth month in motor development in this period of children's life.

Útdráttur

Þessi ritgerð fjallar um rannsókn sem gerð var í Reykavík 2009 til 2010. Rannsókninni er ætlað að athuga hvort börn í leikskólum, sem hafa náttúrulegt umhverfi sem hluta af sínu leiksvæði, öðlist betri hreyfiproska en börn sem ekki hafa slík leiksvæði. Fimm leikskólar tóku þátt í rannsókninni; tveir tilraunaleikskólar og þrír sem notaði eru til samanburðar. Gögnum var aflað með hreyfiproskaprófi, annars vegar í ágúst 2009 og hins vegar í júní 2010. Niðurstöður voru fegnar með hjálp SPSS forritsins. Niðurstaða rannsóknarinnar er sú að börn úr tilraunaleikskólunum sýna betri hreyfiproska á prófunardögum en auka ekki muninn á milli prófana. Niðurstöður þessarar rannsóknar sýna jafnframt að ekki er tölfræðilegur munur milli hreyfiproska kynja á þessum aldri né greinanlegur munur milli barnanna út frá fæðingarmánuði þeirra.

Thesis Statement

In the past few years there has been much awakening in the educational system in Iceland regarding using the outdoor environment as a place for learning. This awakening is probably a part of changes in culture and behavior. An increased interest in walking, cycling and contact with nature is probably reflected in the educational system. Research shows that nature seems to have good influence on students (Maller, Townsend, St.Leger, Henderson-Wilson, Pryor, Prosser, Land Moore, 2008; Ozdemir, and Yilmaz 2008). It makes them feel better and they enjoy themselves more in natural circumstances (Maller et al.2008; Ozdemir, and Yilmaz 2008). The purpose of this paper is to discover if nature makes a difference in a child's motor development.

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1. Introduction

As a physical education teacher, I have always been interested in movement development. The interest increased after I began to teach more or less all subjects from the curriculum in an outdoor environment. Outdoor teaching has become popular in Icelandic primary schools and nurseries during the last five years, and I am lucky to have been a teacher in Norðlingaskóli primary school in an urban area of Reykjavík. Norðlingaskóli is one of the leading schools in outdoor teaching in Iceland. The school curriculum includes, amongst other things, peer teaching, mixed age groups and interest fields in the teaching methods and tries to teach the same things in- and outdoors by applying hands-on methods in the outdoor environment. With the application of those outdoor teaching methods the school is trying to give the students a first-hand contact with nature by making use of nature in work and play and boosting physical prowess and well-being through outdoor life (Vígþórsdóttir, 2011).

Norðlingaskóli and Rauðhóll nurseries, both located in the Norðlingaholt area, share an outdoor classroom with Ársel, which is Reykjavík's center for free time and leisure for youth in Árbær, one of the city's urban districts. The area is a former summer vacation lot in Norðlingaholt called Björnslundur. In the area the schools have set up an outdoor facility which includes both natural and organized playgrounds. Because of a shortage of nursery space for children in Norðlingaholt, the City of Reykjavík decided to build a house in Björnslundur for one ward housing twenty children. At that time more and more families were moving to Norðlingaholt and the sizes of those families

and age spread was not as expected in the plan for the neighborhood. Therefore the City needed to find some ways to expand Rauðhóll nursery. After receiving the new house in Björnslundur, Rauðhóll has four wards for children from 3 to 5 years old. The preschool decided on a schedule for those wards, so that every ward could stay one week per month in Björnslundur.

After two years of using Björnslundur on a regular basis the teachers in Rauðhóll stated the opinion that the children from Björnslundur have, in comparison, better motor skills than children from nurseries that come to Björnslundur for occasional visits. I found this opinion interesting enough to decide to develop a longitudinal study where I tried to see if the influence of nature does matter for physical movement development.

I want to use this opportunity to thank my wife for encouraging me to go for further study and register in the MPH studies at Reykjavik University in 2005 and my father for giving me time and help by using his English skills in reading over the often poorly written text that I gave to him. I also want to thank a good friend and colleague Björg Oddrun Hallås lector in the University of Bergen for support and help in pointing out and providing me with interesting material.

1.1 The Author

The author is a teacher in Reykjavik. I am educated as a sport teacher in Trondheim Norway and have been teaching sports more and less since 1991 in primary and high schools. I have also worked in my free time and leisure services both in Reykjavik and in Egilstaðir, a small town on the east coast of Iceland. I have an experience in using the MOT 4-6 test in the primary schools. I am a certified UEFA - B soccer trainer, currently training young girls in a soccer club in Reykjavik. I have an experience in teaching outdoors and

the last five years I have been an instructor in outdoor teaching in the University of Bergen. From spring 2006 I have been active in politics in Reykjavik, I have been on the board of Culture and Travel and the board of Nurseries and I am currently on the board of Sports and Leisure for the Left Green movement. In September 2010 I was appointed chairman of the Icelandic Sport Committee, a Consultant Committee for the Minister of Education and Culture. I believe in the positive influence of nature because of the influence nature has on me. In my spare time I turn to nature to relax and reload for further work by hiking or fishing in the lakes and rivers of my beautiful homeland.

1.2 Purpose of the Research

The main purpose of this study is to examine if there is a significant difference in children's movement development based on the environmental difference of their nurseries. To find out if there is a significant difference, I will use a standardized movement test called MOT 4-6 (Zimmer & Volkamer, 1987). The sample of participants consists of children born in 2004 attending five of 88 nurseries in Reykjavik. The treatment schools are two, and both have excellent natural environment, facilities and an educational policy to use it. The three control nurseries have no natural outdoor facilities. Every child in those nurseries born in 2004 participated in the study and nearly all were measured on two occasions, in August 2009 and in July 2010. In the thesis the gathered data will be used to put forward following hypothesis:

- 1) Does natural environment have influence on children's motor development?
- 2) Is there a difference between the nurseries on test days?

- 3) Is there a difference in movement development between genders?
- 4) Is there a difference between the children based on birth month?

1.3 A review of the literature

There have been numerous research made on the influence of intervention on the motor development of children. They all have in common that intervention always increases their motor ability. Most of the referring articles for this research are about some kind of intervention. Research has been made on many different interventions but the one I always come back to is play as a factor in the motor development of children. How is it then that playing influences motor development with children? Movement and the positive encouragement towards children to participate is often done through play. Play is so important for children that the UN made an agreement for it. Ginsburg (2007) sites the agreement

Play is so important to optimal child development that it has been recognized by the United Nations High Commission for Human Rights as a right of every child. This birthright is challenged by forces including child labor and exploitation practices, war and neighborhood violence, and the limited resources available to children living in poverty. However, even those children who are fortunate enough to have abundant available resources and who live in in relative peace may not be receiving the full benefits of play. (Ginsburg 2007 p.182).

Ginsburg continues in the same article where he states that:

“Play is essential to development because it contributes to the cognitive, physical, social, and emotional well-being of children and youth.” (Ginsurg 2007 p.182).

Playing a directed game with learning objectives is not enough. Children need undirected self-initiated free play. Ginsburg continues:

Undirected play allows children to learn how to work in groups, to share, to negotiate, to resolve conflicts, and to learn self-advocacy skills. When play is allowed to be child driven, children practice decision-making skills, move at their own pace, discover their own areas of interest, and ultimately engage fully in the passions they wish to pursue. (Ginsburg 2007 i p.182).

It may be that play is different from country to country depending on culture and environments and it seems likely that children develop better motor skills in traditional movements after region. Cools et al. (2009) report that in their research where children's movement skills were compared, that children from Northern Sweden showed considerably better skills when it came to skiing than a compared group from the USA and UK.

However, cultural differences exist within the Western hemisphere and the kind of activities children engage in are likely to differ by countries. For example, in Sweden, particularly in the northern part, winter sports are popular and many children learn to ski and skate at an early age. These are factors that might improve balance. Conversely, Rösblad and Gard (1998) report that one factor that could have a negative effect on the motor development of Swedish children, particular in the area of manual dexterity, is that the age of school entry is six or seven, which is late compared to the USA or UK (Rösblad & Gard, 1998).

We can probably see in later stages in life that in for example sports, nations background differ. One of those could be skiing where we see the Nordic countries do very well in the Nordic discipline and the Alpine nations Austria, Swiss, Italy and France do well in alpine discipline. We also see Iceland doing great in handball (second in the Olympics 2008), an indoor sport, where sports venues are available in all weathers all year round. Although not researched, one can draw the conclusion that this comes from the play and the culture the children grow up in in those countries. The influence that play

has on children's motor development is not fully researched like Rintala and colleagues state in their research (Rintala, Pienimäki, Ahonen, Cantell, & Kooistra, 1998)

Additional research is needed to explore the appropriate balance of play, academic enrichment and organized activities for children with different temperament and social, emotional, intellectual and environmental needs. (Rintala, 1998, p. 188).

There are many definitions of motor development. To understand the results better it is useful to know the difference of fine and gross motor development. The following definition is from a homepage belonging to the Encyclopedia of Children's health:

Gross Skills, which are the larger movements of arms, legs, feet, or the entire body (crawling, running, and jumping); and fine motor skills, which are smaller actions, such as grasping an object between the thumb and a finger or using the lips and tongue to taste objects. Motor skills usually develop together since many activities depend on the coordination of gross and fine motor skills. (Health, 2010. p. 1).

In research done on motor development, researchers have tried many types of interventions. Research on physical intervention and the influence it has on health are numerous and the overall result is that training has positive influence on motor development (Zimmer & Volkamer, 1987). This is also the fact for any kind of training or other kinds of encouragement on children regarding physical movement. In his research P. Rintala et al.(1998) found that the children in a psychomotor training program did improve more than those who followed a regular physical education curriculum, particularly on the object control task in the Test of Gross Motor Development (Rintala, Pienimäki, Ahonen, Cantell, & Kooistra, 1998). This research seems to be known throughout the nursery community since the psychomotor training is used to influence many kinds of disorders in the nurseries. In his book Kiphard (1994) reports that training is widely used in nurseries to handle developmental disorders. He also defines the focus areas of this training as

gross motor, ball skills and body. He also reports that the result is always the same; training matters (Kiphard, 1994) .

Previous research has shown mixed results when motor development between genders is compared. In many of the previous research on motor development gender has showed mixed results. Hirtz (1985) reports that he did not find a difference between genders in the preschool age group (HIRTZ, 1985). Winter (1987) and (Zimmer & Volkamer, 1987) got the same results Hirtz (1985) reports some significant differences in motor development between boys and girls, but at a later stage of childhood. This is in contrast with Venetsanou and Kambas (2010) where he reports differences in favor of girls in the preschool. (Venetsanou & Kambas, 2010).

What has been happening during the recent years? Research in USA has shown that children today spend less time playing outdoors than they used to do before. A research done by Clements (2004) at Hofstra University in USA where 800 mothers were asked to compare their own childhood to their children's, shows that children are spending less time now than before playing outdoors. 70% of the mothers reported that they had spent time playing outdoors every day compared to only 31% of their children (Clements, 2004). One of the factors that might have something to do with this change is the No child left behind Act from 2001 where some school districts responded to the act by reducing time spent on physical action and recess. Ginsburg (2007) found that:

Reduced time for physical activity may be contributing to the discordant academic abilities between boys and girls, because schools that promote sedentary styles of learning become a more difficult environment for boys to navigate successfully. (Ginsburg, 2007, p. 184).

Further research on the matter is related to the primary schools. The act of implementing the No child left behind act in 2001 seems to have led to increased obesity and made higher Body Mass Index (BMI) in children, the leading problem with children in modern society in the USA.

1.4 Effects of psychomotor training program on motor skill development

Nature and the benefits of nature, especially for children, has been researched for some time. The interest has been growing and associations formed to work on reconnecting children to nature. However those research that I studied have the common result that all training has a positive influence on motor development (Zimmer & Volkamer, 1987; Cools W. , De Martelaer, Samaey, & Andrie, 2009). In recent years there has been a growing interest in the possible influence that nature has on human behavior. Those researches are of interest to those that seek to understand better the development of the human body and the connection of body and soul.

ADHD is a behavioral disorder and more and more children are diagnosed with ADHD every year. Researches have been done about the influence of nature on the attention span of children with ADHD. Kuo, and Taylor (2004) found in a research, that green areas have positive influence on reducing the symptoms of ADHD. In 2008 they built on their previous research about the influence of nature on ADHD with a research where children diagnosed with ADHD walked in the park for some minutes every day to find out if walking had an influence on the children. The result was that the walk had a positive influence on the children's attention span (Faber Taylor, 2008). Wells (2000) found out in her research that in general being close to nature helps boost the attention span of a child with ADHD. When the children were moved to better housing with natural green spaces she found that profound differences emerged in their attention capacities, even with the effects of better housing taken into account. (Wells N, 2000). This coheres with my own experience. In my job as a teacher in an outdoor environment I have experienced that the

green outdoor area has a positive influence on children with ADHD and they seek opportunities to stay there if possible.

There are more positive signs on the influence of nature. Research has shown that nature has influence on obesity. Cleland, Crawford, Baur, Hume, Timperio & Salmon (2008) found in a research that older children who spend more time outside tend to be more physically active and are less likely to be overweight. Bell, Wilson & Liu, (2008), found in a research that children in more vegetated settings were less likely to have a higher BMI over 2 years compared to children in less vegetated settings. Potwarka, Kaczynski & Flack (2008), found that children with a park or a playground within 1 km from their home were more likely to have less weight problems than children without a park or playground near their homes.

This research does show a positive influence of the natural environment on obesity in children, and there has been very little research done on the matter. I mention earlier the importance of free play on children's development. Research and studies have also been done on the influence of play on health in general. There are interesting findings like Maller, Townsend, St.Leger, Henderson-Wilson, Pryor, Prosser and Moore (2008). They found that contact with nature shows benefits in health related forms. There is evidence of benefits from being in contact with green areas, plants and animals. In 1997 Grahn and Stigsdotter report that children that spend time outdoors in all weather conditions have better attention and show less stress.

Burdett and Whitaker (2005) report that:

Unstructured active play with others, including with parents, siblings and peers, is a major opportunity to cultivate social skills. This is because all play with others requires solving some form of a social problem, such as deciding what to play, when to start, when to stop, and the rules of engagement. Solving these dilemmas and conflicts that arise in play

encourages children to compromise and to cooperate. (Burdette et al. 2005, p. 48).

Wells and Evans (2003) also report an interesting study that even the view of green plants reduces stress with children and the access to green areas is positive (Wells & Evans, 2003).

To further strengthen the role of nature and its positive influence I want to quote the homepage of Children and Nature Network (C&NN). The C&NN are a grass root organization with the purpose to reconnect children with Nature. In a report from (2010) the editors have highlighted from a policy statement published in American Academy of Pediatrics' by Binns, Forman, Karr, Osterhoudt, Paulson and Roberts (2009):

This article is a policy statement by the American Academy of Pediatrics' Committee on Environmental regarding the influence that community design has on children's opportunities to be physically active. The Committee highlights the role of neighborhood design in promoting recreational and incidental or "utilitarian" physical activity, such as the availability of parks and recreational facilities, as well as children's ability to walk to school. The Committee also highlights important factors influencing children's physical activity, including traffic danger, the presence of sidewalks, and perception and fear of crime. Finally, the Committee provides a number of specific recommendations for pediatricians and government to promote children's physical activity in the built environment and support more active lifestyles. (C&NN, 2010, p. 9).

This statement, research and results alone more than justify further research on the influence of nature on children in a wide perspective.

1.5 Nurseries

Before going any further I think it is necessary to take a little detour and look at the beginning of preschools. The history of nurseries can be traced all the way back to 1798, when Johann Heinrich Pestalozzi, born in 1746, gave a number of orphaned children a shelter, after the invasion of France into Switzerland. He converted a deserted convent into a school for those children. Later Pestalozzi opened schools in the towns of Neuhof and Yverdon. His methods in education were similar to those that are popular in Iceland today. He believed in looking at each individual and his possibilities, his methods were child-centered and based on individual differences, sense perception, and the student's self-activity. His methods attracted interest from both European and American educators. Pestalozzi is thereby one of the pioneers in the education of children (Trust, 2011). One of his pupils and later coworker was Fredrick Wilhelm August Fröbel, born 1782. He began his education in Muterschule in Frankfurt where he learned about Pestalozzi's ideas. He later worked with Pestalozzi and formed his own ideas about childrens education. Fröbel formed his ideas by observing children playing and introduced the concept of free work in pedagogy. He also established the game as typical form of life for children and that play has an educational worth.

Fröbels ideas and work are still fundamental in preschool work and his gifts, better known as Fröbelgaben, the geometric building blocks and pattern activity blocks, are still very popular in children's games. The reason for mentioning those two pioneers in nursery work is obvious. For his pioneer work Fröbel is often referred to as the father of modern nurseries (Web, 1998).

In Iceland the nurseries are supposed to work in the spirit of a curriculum regarding physical education and the big question is whether they do? That is difficult to answer without further research.

The indication is that they do not and the recent financial crisis in Iceland has not helped, since funding of nurseries has suffered financial setback. Offering the services of nurseries is not obligatory, some of the municipalities have no legal obligation to offer the service. Therefore cutting down on the financial support to nurseries is an easy way for a municipality to save money. It is then up to headmasters to use the support in a responsible way within the nursery and an easy way to cut back is cutting out field trips and rent of housing and equipment since they are services that are usually not paid for by the nursery itself. This is not the only reason for cutbacks in physical movement education. Kenneth Ginsburg (2007) points out in his research that in the United States the No Child Left Behind act of 2001 had negative consequences on physical activity in primary schools.

Currently, many schoolchildren are given less free time and fewer physical outlets at school; many school districts responded to the No Child Left behind Act of 2001 by reducing time committed to recess, the creative arts, and even physical education in an effort to focus on reading and mathematics. This change may have implications on children's ability to store new information. (Ginsburg, 2007, p. 183.)

Ginsburg continues in the same article on the possible outcome of cutbacks in physical activity:

Reduced time for physical activity may be contributing to the discordant academic abilities between boys and girls, because schools that promote sedentary styles of learning become a more difficult environment for boys to navigate successfully. (Ginsburg, 2007, p. 84).

The same thing might be happening here in Iceland but not because of an act like the No child left behind but rather because of the agenda that children should know how to read, write and fundamental math before they begin in

primary school, as the new curriculum for the MA degree in preschool teacher education shows (Education, 2011). There is a different culture in nurseries from country to country. In Iceland children spend time outdoors in every kind of weather for at least one hour a day, and longer during the summer. There are exceptions such as extreme cold temperatures and high wind but the general rule is that they spend time outdoors every day. This is believed to strengthen the children and it gets them used to Icelandic weather. This determination and rule is not necessarily the case in other countries, often with consequences. While looking for earlier research done to try to explain the effects that nature has on children I found a network called The Children and Nature Network (Cheryl, Louv, Bodner, & Guns, 2008). This network or movement has on its agenda to reconnect children to nature. The Movement has been emerging nationwide in the USA from 2006. The homepage of the C&NN was the best tool I found and I used it to gather information for the research. In a monthly newsletter on the homepage from January 2008 the C&NN say about the Lifestyle in the USA.

Indoor lifestyles are already evident among children: startling rates of obesity, the onset of one-time adult conditions such as diabetes and shorter life expectancy. Thankfully, though, the movement to reconnect kids with nature has seen rejuvenation in the last few years, and experts predict that good health will be a major motivation in bringing families back to nature. (C&NN, 2008, p.11.)

2. Procedures

2.1 Selecting the nurseries

The nurseries were selected for this experiment after carefully viewing their curriculum and their location within the city. Rauðhóll and Rofaborg are located in the outskirts of the city. Both have a program and have the opportunity to use nature as a playground for the children. Grænaborg, Ásborg and Álftaborg have, due to being located in the middle of the city, less opportunity to use natural surroundings for the children. The headmasters of those preschools are interested in using the natural surrounding of the nurseries but lack the time and the resources to do so. When asked, they replied that to take the local bus to the areas of interest was too time consuming and to hire a transport was too expensive to do on a regular basis, so this could only be done irregularly. The location of nurseries in Reykjavík is such that there are more nurseries that do not have an opportunity to use the nature than those that can. This has to do with the planning of the city as the nurseries are usually located in the middle of residential districts. Those locations because of distance from natural surroundings diminish the chances for those nurseries to use nature as a resource for play and education.

2.2 Gathering permission

The authorities in Reykjavik were contacted and asked for permission for the research. This was allowed (see appendixes 5.1 and 5.2) The nurseries chosen were contacted for approval of participation and were visited for

further planning about timing, and where the test could be performed within the establishment. The headmasters were asked to send the parents a request for approval for the children's participation in the research (appendix 5.3). In the letter the parents were offered that the results would be sent to them after the second test. Over all, only the parents of one child denied the participation in the research and only one asked for the results. During the visit it was also discussed how the tests could be performed and in what way they would have the least interference in the preschool. The teachers of the wards were informed and asked for cooperation regarding the dates for the visits and to inform the headmasters how the tests were to be organized. We also decided which dates were acceptable for the nursery and what was expected of them in means of space to perform the test. It was also discussed and decided when it would be best to perform the tests. Where were the children to wait to take the test, and where to go after taking the test? This actually differed from nursery to nursery. In some nurseries the children next in line were already in the ward playing, while in some nurseries the children were playing outside. However, the staff had at all times a clear view of who was next and kept the children ready without putting any pressure at all on the children. For this cooperation I am very grateful as it saved a lot of time and made the tests easy to perform.

The surroundings for taking the test differed from one nursery to another. The demand was that there would be no disturbance and sufficient space to take the test. One of the projects needed distance up to four meters, and another a space for a target on a wall. This was met by the nurseries and the staff cooperation was outstanding. They made plans so that the children knew what was coming, and prepared the children by telling them that they were to do some tasks for a man, and that he was coming to the school on a certain day and this would be a lot of fun. By placing the test on the plan for the day, children, parents and the nursery staff were informed about what was coming. I was allowed space and time to work. In two cases there was a need for assistance. In both cases the children were diagnosed as autistic. I opted to

let them take the test to see how they developed during the year. These children are in the sample for nurseries, but are removed from the data in the comparative findings.

2.3 The Nurseries in the research

2.3.1 Rauðhóll

Established in 2006, it is located in Norðlingaholt, a new residential area in Reykjavík. Rauðhóll is a five ward nursery for 106 children and a treatment nursery in the research. A long waiting list for a space in Rauðhóll led to the urban authorities in Reykjavik deciding to expand Rauðhóll from its original four ward nursery to five wards. The new ward, a 100m² whole year leisure house, was placed in Björnslundur, an outdoor classroom owned and used by Rauðhóll and Norðlingaskóli, the elementary school in the neighborhood. The outdoor classroom has been planned and prepared in cooperation with students from the University of Bergen, Norway. Students studying Outdoor Teaching are given the choice to do their final test in Björnslundur by preparing and teaching children in the outdoor classroom. The idea concerning Björnslundur is to have a mixture of wild and organized areas where one can organize education outdoors. Four wards in Rauðhóll use the new cabin in Björnslundur. The plan is that every ward has the house and its surroundings for a week each month. Parents are informed about the outdoor classroom and its surroundings when the children are listed at Rauðhóll. The nursery and the outdoor area are special and not common in the nurseries in Reykjavik. Amongst other things the playground is not fenced in like the usual

playgrounds. The trees fence the playground in and there has not been an instant where a child has tried to leave the area. The test for motor skills was taken in the new ward in Björnslundur. I was given a room mostly used for art and leisure. The room was sufficient and gave the necessary peace required for the test. The children that were not in the ward at that time were escorted specially to the wooden house to take the test. They came in few at a time and were allowed to play in the area while they were waiting to take the test. The children seemed to love playing in the area and to be allowed to come when it was not their week seemed to be a pleasure for the children. The test was easily performed. The children were willing and thought it was exiting to participate.

2.3.2 Rofaborg

Rofaborg, located in Árbær, is a five ward nursery with space for 108 children. Rofaborg is a treatment nursery in the research. Rofaborg has the unique position to be located close to Elliðaárdalur, Reykjavik's prime outdoor area. In Elliðaárdalur there has been planting of trees and recovery of natural circumstances for a long time. This has been done to preserve the unique surroundings that the valley offers. Rofaborg uses a small part of the valley as its outdoor classroom. The part that Rofaborg uses is a part that has trees and plants but also includes lava cliffs and stones that form a challenging landscape for youngsters. Rofaborg has a schedule for how they use the area. The children walk to their location in the valley, about 10 minutes walk, once a week, to work on a project usually connected to nature and play in an area with lava cliffs and trees and some high bottom vegetation. The surroundings are quite charming and offer a lot of opportunities for study and play. Like in Rauðhóll parents are informed about the outdoor classroom and when and how the school plans to use the area. Rofaborg has prepared a

brochure about the outdoor class and it is sent home with new children that come to Rofaborg. In Rofaborg I was offered to use an area normally used as an indoor playing area and resting quarters. It was probably the best location since it was more like a small sports hall than anything else. There was a lot of space and easy access to the children since the hall is located between the wards where the participating children dwell. The only thing that may have affected the test is that the doors were of glass and only partly shaded, and possible to see through. It came up that other children were watching. The teachers of the wards did observe this and tried to point the interest on other things and in my opinion did a very fine job, but in one instance a child got disturbed by this. In this case I tried to compensate by letting the child repeat the task.

2.3.3 *Grænaborg*

Grænaborg is the oldest of the nurseries in this research. It was established in 1931 and later relocated and rebuilt in 1983. Grænaborg is located in downtown Reykjavík. Grænaborg is a four ward nursery where 83 children can stay at one time. Grænaborg is a control nursery in the research. Grænaborg has a nice, newly renovated outdoor area. The area is partly made from lava which is the theme for the outdoor area. Grænaborg has a nice recreation hall in the heart of the school but did not recommend that I used it because there might be disturbance from other children since the area is located between two wards and children and employees need to cross it when they need to communicate. The children have a gym class once a week, 30 – 40 min, in the recreation hall. The classes are organized by the staff. Every ward has its own day in the hall to use as they please. The first test was taken on two locations in Grænaborg, in the recreation hall and in a small room on its side. The areas worked well but moving between rooms between tasks was something that I did not like. It somehow took the flow

away from the test. This is of course based on a feeling, I asked for permission to take the whole test in the recreation hall. That was positively granted by the staff and the later tests in Grænaborg were all taken in the hall. The staff was very aware of what was going on and to minimize disturbance by using the hall, I used it on the day that the participating children were scheduled to have the hall anyway. After overseeing a test the rector told me that at least one of the tasks in the test was frequently on the training list for the children. This is task number 14; a stride jumping with rebound with arm clapping above. This task is quite common and frequently used in Iceland.

2.3.4 *Álftaborg*

Álftaborg is a four ward nursery located in central Reykjavík. Established in 1968 as a three ward nursery Álftaborg was changed in 2007 to a four ward preschool and the playground renewed. Álftaborg is a control nursery in the research. Álftaborg has an opportunity to rent a gym hall from its neighbor Fram soccer club. The children go once a week during the winter and practice. Álftaborg is fortunate to have a gym teacher who makes the plan for the classes. The test in Álftaborg was performed in an area usually used for art and leisure. The area offered was out of sight for the children, not isolated for sound but the staff knew that I needed minimum disturbance and changed the daily routine a little to give me as much peace as possible. In that they succeeded and I did not have any problems performing the test.

2.3.5 *Ásborg*

Ásborg is a five ward nursery with 119 children, the second largest in Reykjavík. Originally Ásborg was two separate institutions, Dyngjuborg kindergarten and Thorvaldsen toddler's room. Ásborg is a control nursery in the research. In 1988 Ásborg was established by joining those two nurseries and a new spacious playground was built. Like the other nurseries Ásborg has a plan that every child shall have a 30 min physical training session every week. The program varies on the age of the children. The teachers responsible for the ward plan the time themselves. Ásborg is located near Laugardalur and in walking distance to a large recreational area in Reykjavik hosting the Reykjavik Zoo & Family Park, a botanic garden and Reykjavik Zoo and family park Laugardalur also hosts a sports club and all international sport venues for diverse sports. Ásborg uses the area on an irregular basis by visiting the zoo and a sports club located in Laugardalur. Ásborg has an indoor playing area but it is very open and difficult to use for the test. The test was therefore performed in an area used for art and leisure. The area offered is a semi closed area where traffic could be easily controlled. The test went on with ease and I thank the staff of Ásborg for a nice cooperation.

2.4 The MOT 4-6 test

The test used to gather the data for the study is *The Motorisher screening test* (MOT 4-6) designed by R. Zimmer and M. Volkammer (see Appendix 2) (Zimmer & Volkamer, 1987). The MOT 4-6 is well known in Iceland. It was translated to Icelandic in 1990 by Elísabet Ólafsdóttir on behalf of the Ministry of Education as a tool to measure the motor development of six year old children in the Icelandic primary school system (Appendix 2). The test has since been frequently used as an assessment tool in Icelandic schools. The experience of the test, the understanding of its results and the fact that it is specially made for the age group in question were the most important factors

of my choice. The MOT 4- 6 has from the day it was published in Icelandic been a popular test to use. It is more or less the only test that I have used to test children in primary schools in the last twenty years. One of the factors that make the test popular is that the MOT 4-6 is a coordination assessment tool for preschool children, recommended for educational research purposes because of its specific age range (Cools W. , De Martelaer, Samaey, & Andrie, 2009). Another important factor that makes the MOT 4-6 popular is that the tools used to perform the test are easy to obtain and usually something that one can find in most pre- or primary schools. Tools like a broomstick, a rope, scotch tape and a tape measure are a part of those tools and the fact that the test and its guidelines have been translated into Icelandic makes the test appealing to Icelanders. According to Żółkowska (2007):

The Motorisher screening test designed by R. Zimmer and M. Volkammer is a tool which allows the level of psychomotor development in chi years and it does soon numbers of layers through diagnosis of: Fine motor skills, gross motor skills, speed of movements and whole body coordination. It consists in 18 simple tasks to be performed by a child for example tapping, jumping repeatedly, over specific target, catching a dropped stick, carrying and placing ball in on a box. (Żółkowska, 2007, p. 128).

Żółkowska continues later in the same article describing more of the qualities of the MOT 4 – 6.

"The activities to be performed are short; each task is different, owing to which a child unable to perform one task is not discouraged by his/her failure and does not lose motivation to perform the next one". (Żółkowska, 2007, p. 128).

From this experiment I can agree with her. Performing the test over 200 times I never got the feeling that a child felt disappointed or melancholy not finishing a task perfectly. That may be because of the carefully constructed guidelines that follow the test and the great emphasis on the controller to stick to. Cools,

De Martelaer, Samaey & Andrie (2009) point out that it is necessary for the administrator of the test to be able to demonstrate every task adequately (Cools W. , De Martelaer, Samaey, & Andrie, 2009).

The test has other qualities. Żółkowska points out that the MOT 4-6 is not time consuming and self-made materials may be used according to description from the authors (Żółkowska, 2007). The test is rooted in both the Lincoln Oseretsky Motor Development Scales (LOMDS) and the Körperkoordinationstest für Kinder (KTK), to which adaptations have been made to make the test appropriate for the specific age group of preschool children (Zimmer & Volkamer, 1987). The authors believe that children in this age group have specific needs and require a different pedagogical approach. Cools et al (2009) find that the MOT 4-6 features 18 different items including locomotion, stability, object control and fine movement skills. A well-organized score sheet enhances standardization. To guarantee maximum attractiveness of the test the subsequent items have different motor demands (Cools W. , De Martelaer, Samaey, & Andrie, 2009).

The MOT 4- 6 consists of the following tasks

1. Jumping in and out of a horizontal hoop.
2. Toe-to-heel walking in a forward direction.
3. Making dots on a paper with a pencil (tapping).
4. Picking up a handkerchief using toes. (Twice: preferred and non-preferred leg.)
5. Jumping repeatedly sideways across a rope.
6. Catching a dropped stick.
7. Carrying balls into a box.
8. Toe-to-heel walking in backward direction.
9. Overhead toss for accuracy.
10. Picking up matches and putting in box.

11. Step through a vertical hoop (twice).
12. One legged jump into a hoop (twice: preferred leg, non-preferred leg).
13. Catch a rubber ring.
14. A stride jumping with rebound with arm clapping above head (jumping 10 sec).
15. Standing jump over a rope.
16. Body rolling along vertical axis (twice: back-front-back, front-back-front).
17. Raise-sitting with a ball from a squat position.
18. Jumping in and out of a horizontal hoop while making successive 90 degrees turns (twice).

Each test, except for the first one, is assigned the score of 0, 1 or 2 (maximum). The first test is used only as warm up.

In accordance with the purpose of the test, the total motor score expresses children's performance.

The Norwegian health administration formed a group of leading forensic specialists, in the field of motor development, to make a comparison of frequently used tests and in that review the authors Fjørtoft, Pedersen, , Sigmundsson & Vereikjen, (2003) said about the MOT 4 - 6 test;

"The test retest shows a reliability of 0.80, consistency of 0.74." (Fjørtoft et al. 2003 p. 18).

The authors continue further by saying:

"...although the test has qualitative measures its shows a high reliability; test- retest 0.85. Validation has logic valuation variation and compared to KTK test has and correlation of 0.68 in age homogenic groups." (Fjørtoft et al. 2003, p. 18).

The test has proved itself to be more than a measurement of motor development. Cools et al. (2009) report that:

"A well-organized score sheet enhances standardization. Additionally, free space for qualitative notes about the child or its performance is provided." (Cools et al 2009 p. 2).

In this research all children born in 2005, in the chosen nurseries, took the test but not all gathered data is used. Among the data not used is data from children with Autism syndrome. One had been diagnosed before I tested the individual but three I did not know about. The test revealed them to me in the way that I found their tests in some ways interesting. Normal in some tasks but out of norm in others. When I asked about the individuals in the wards I was given the information that some were already diagnosed with Autism, some were being diagnosed and others borderline cases.

2.7 Green Areas

There are interesting times ahead in the field of research of the influence of nature on humans. Associations are taking action establishing webpages on the matter. One of those associations is The Children and Nature Network (C&NN). When preparing this research and gathering information the name of C&NN came up repeatedly. The C&NN gathers all possible information on the networks homepages and makes it available for interested parties. One of the most interesting things I found was the book *Last Child in the Woods*. In that book the author Richard Louv (Louv, 2008), Chairman of the Children and Nature Network in USA, has brought together a considerable deal of research done to point out that exposure to nature is essential for children's healthy physical and emotional development. Louv also introduced a physical disorder in that book, the "Nature Deficit Disorder", a disorder that refers to the alleged trend that children are spending less time outdoors resulting in a wide range of behavioral problems. This disorder is not recognized in any of the medical manuals for mental disorders. But the book *Last Child in the Woods* and possibly the attention the disorder has created, led to Louv being invited to speak about it in an annual meeting of pediatricians in October 2010. This shows that pediatricians are taking interest, maybe not in the phrase as such, but in the effects of nature on children's behavior.

The definition is an experiment by the author to explain a situation a child or an adult can find themselves in after being denied contact with nature for a long period of time. An interesting statement when many researchers are trying to find the link between nature and better physical health. The effects of nature on children's welfare have been researched in many countries. More often the research has been on the psychological side or how the behavior of children changes when confronted by nature. The C&NN is a movement of interest that got deserved attention when the American Public Health Association features a front page article on the movement in its monthly paper *The Nation's Health* – October 01, 2007.

There is a growing interest within the primary school system to use outdoor teaching. Fjørtoft (2004) reported on the positive influence in using the outdoors as a place for teaching. The report draws up a picture of the influence that nature has on motor movements in children. In the report they talk about elements like trees, hills, flatland, and bushes that lead to physical movements like walking, running, clattering, throwing and jumping. Those actions lead to, amongst other things, better balance, coordination, strength and speed (Fjørtoft, *Landscape as Playscape*, 2004). In the report Fjørtoft is talking about the influence on children in primary schools. There is no reason to think that the outdoors does not have the same effect on children in nurseries. The movements and schedules should be made with them in mind, and aimed at the physical movements that should be presented. There is more research that shows the positive influence that nature seems to have on children. In their studies Taylor and Kuo (2006) found that when given a choice, children choose natural playgrounds when they intend to play creative games. They also state that children have a greater ability to concentrate in natural settings results tell us that there is a connection between nature and attention and concentration with children. That fact should not be surprising, in fact we hear and read about artists, writers, musicians and athletes that retreat to nature when finessing a script or preparing for some very difficult task that demands their full attention and concentration. Ozdemir and Yilmaz

(2008) made their research on children's BMI value according to the landscape the children played in. In the results they report of a relationship between BMI and advanced landscape. However, in a surprising direction, schoolyards with so-called advantage landscape had higher BMI than those that did not (Ozdemir & Yilmaz, 2008).. Advanced landscape means more manmade environment and easier to navigate through. In Iceland there has also been research done on what influences BMI. In that research done in Iceland, Sigfúsdóttir, Kristjánsson and Allegrante (2006) report that:

"BMI was most strongly associated with academic achievement, followed by diet and physical activity as weaker but significant correlates. But BMI and health behavior variables are overshadowed by parental education, absenteeism and self-esteem." (Sigfúsdóttir, Kristjánsson and Allegrante, 2006, p.77).

This research is not aimed at nature as an influence factor on BMI, but the physical activity factor made the research interesting. Researchers in the US, Australia, Sweden and Canada have found that children tend to play more creative games when playing in green areas. In Denmark a recent study comparing two groups of children, one from a traditional preschool and another from a preschool where children stay outdoors all day, found out that children that stay outdoors all day are more alert and are better at using their bodies and significantly more likely to create their own games. Hanna and Cousins (2001), write about the importance of applying the knowledge of benefits of nature to enhance the health of the public (Hanna & Coussens, 2001).

In an article from the homepage of C&NN from 2006 Richard Louv quotes Howard Frumkin M.D. chairman of the Department of Environmental and Occupational Health at Emory University's School of Public Health from his article in the American Journal of Preventive Medicine. Frumkin writes that the most overlooked field in modern medicine is the evidence that connects nature and well-being (Cheryl, Louv, Bodner, & Guns, 2008).

This may be the result one can draw from all the material that I read when preparing this research. There is a lot of material that shows the benefits of treatment on children's motor development and there is a lot of material that shows the positive influence that nature has on human beings, but there is a lack on research digging deeper to find out why and what methods could be used to benefit from this positive influence. Growing interest in the field is promising as Louv points out in an article from 2008 on CNN homepage. In the article he writes.

For decades, environmental educators, conservationists, naturalists and others have worked, often heroically, to bring more children too nature- usually with inadequate support from policy-markers. Since 2005, a number of convergent trends, including an intensified awareness of the relationship between human well-being, the ability to learn, and environmental health, as well as concern about child obesity, and the national media attention to nature deficit disorder, are bringing the concerns and these veteran advocates before a broader audience. (Louv; 2008, p. 9).

Louv continues later in the same article:

Growing interest in this area also suggests the need to conceptually expand areas of study for future research. For example, economic studies of the regional and national impact of the nature deficit are needed, combining such measures as potential health savings, better school performance, enhanced real estate values and the financial impact of expanded nature recreation for children and young people. An urban region tackling such a task might then set an example for other regions by producing an annual report card on the total benefits and deficits of the human-nature connection within the community. This is one kind of research which is needed. (Louv, 2008, p. 9).

From time to time it can be fortunate that economics comes into the equation. But what is the cost of being isolated from nature? What is gained by saving the nature?

2.8 Methods

This study is based on a non-randomized longitudinal control group design. A longitudinal study with two testing points, nine months apart. Testing children born 2004 in five nurseries in Reykjavik, Iceland using a well documented test, The MOT 4 – 6, a test specially made to measure the motor development of children aged four to six.

After receiving permission for the research from the Reykjavik Board of nurseries, the selected nurseries were contacted through phone to get their approval for participation. The phone calls were followed up by a visit to look for acceptable locations in the nurseries for the test, and suitable dates. The tests were performed twice in all of the nurseries, in August 2009 and June 2010. Each time gathering of the data took three weeks. One and a half week to visit every nursery, sometimes two days in a row, the next week and a half to follow up and test children that had been absent on testing days for various reasons. The procedure was as follows: I came to the nursery at a prearranged date, contacted the rector and the responsible party for the participating ward. The area that was arranged was prepared by setting up lines and all the necessary markings on the floor and wall (target). Where it was obvious that more than one day would be needed for testing, the plan was to visit those nurseries two days in a row. I decided that I would not test any child after 15:00. This was done on the advice from the staff of the nurseries. Their opinion was that after that time the child's focus was diminished after a long day. No tests were scheduled during lunch time or during the resting hour after lunch. This was done to disturb the children's daily routine as little as possible.

108 children born 2004 were registered in the five nurseries. Every parent or a responsible adult were contacted by letter, distributed through the nurseries, for their permission for the child's participation. Only one party

denied participation. 107 children in 5 nurseries in Reykjavik Iceland were tested, but the data concerns only 89 children. Results from eighteen children were filtered out of the research for various reasons like being absent due to sickness on either measure occasion or changing participating nurseries during the research. The data was divided into two groups, Treatment group (Trmt), that is nurseries that have and use natural outdoor environment according to plan, and Control group, that is nurseries with no natural outdoor area and no plan to use the nature as play ground. The treatment group consists of two nurseries and the control group of three. In the latter group the nurseries are smaller so they are three to even the number of children and have the two groups as equal in number as possible. Month of birth and gender were included in the data.

The data was put in an excel sheet that was controlled two times by different individuals to look for mistakes.

The Mot 4 - 6 gives a possibility to divide the tasks up to six categories, but in this research I chose the following since they form the interest field of the research. The data can at any time be divided into six categories for further research. The four groups chosen are:

Balance tasks: nr

2. Toe-to-heel walking in a forward direction.

8. Toe-to-heel walking in backward direction.

12. One legged jump into a hoop (twice: preferred leg, non-preferred leg).

14. A stride jumping with rebound with arm clapping above head (jumping 10 sec).

18. Jumping in and out of a horizontal hoop while making successive 90 degrees turns (twice).

Gross motor tasks: (gross move).

1. Jumping repeatedly sideways across a rope.

7. Carrying balls into a box.

11. Step through a vertical hoop (twice).

13. Catch a rubber ring.

15. Standing jump over a rope.
16. Body rolling along vertical axis (twice: back-front-back, front-back-front).
17. Raise-sitting with a ball from a squat position.

Fine motor tasks: (fine move).

3. Making dots on a paper with pencil (tapping).
4. Picking up a handkerchief using toes (twice: preferred and non-preferred leg).
6. Catching a dropped stick.
10. Picking up matches and putting in box.

Coordination tasks: (mind hand):

6. Catching a dropped stick.
7. Picking up matches and putting in box.
11. Catch a rubber ring.
14. A stride jumping with rebound with arm clapping above head (jumping 10 sec).
18. Jumping in and out of a horizontal hoop while making successive 90 degrees turns (twice).

Some tasks are in two of the categories. Żółkowska (2007) writes about these instances. This is normal since some tasks can measure more than one movement. Task one is not in any of the categories because it is a warm up task, more to establish that the children understand what they are asked to do and are motivated to take the test. (Żółkowska, 2007).

The program was asked to compare the results between the treatment schools (trm1) and non-treatment schools (trm0) from time 1 to time 2 (T1 and T2). To deviate and measure the results from the data according to the following variables: treatment, school, and gender and birth month. By running the data through the SPSS program under those conditions, we should see if the treatment groups gain significantly more motor development in the categories chosen, during the time frame given. The results show us the status on dates chosen. That information is not the aim of this research but

can show us a trend and that further research may be needed to see if my question is relevant for further testing.

2.9 Measures

The dependent variables in the research are:

Balance, fine movement (Fin move), gross movement (Rmove) and Coordination. All dependent variables are measured on two time points.

The Variables are as they appear in the tables:

Trmt: Treatment or type of nursery mean of dependent variable when time increases by 1.

School (Trmt): Nursery that is conditional within the Trmt variable (that is all nurseries are a part of Trmt but only as either in the group 0 or 1).

Gender: girls = 1 control variable and boys = 0. Measure if girls score a higher mean on the dependent variable.

Month: Birth month of the participant (control variable).

Index1: (measures the change from time 1 to time 2 on the dependent variable for all participating children).

Trmt*Gender: Measures if there are more girls in the Trmt schools (which seem to be the case).

Gender*Index1: Measures if girls change significantly more than boys between the measure points on the dependent variable.

Trmt*Index1: Shows us if there is a significant change between Trmt schools and non-Trmt schools within the given time frame.

Index1 or time is the independent variable.

2.10 Analyses

The statistical analyses were conducted with the SPSS program. Analysis of variance (ANOVA) was used to compare groups over time while controlling for background variables and school-level. Nesting the data is reported in profile plots and ANOVA coefficients. The post-hoc comparisons are based on 95% confidential intervals.

3. Results

Results are divided into balance, fine movement, gross movement and coordination.

3.1 Balance

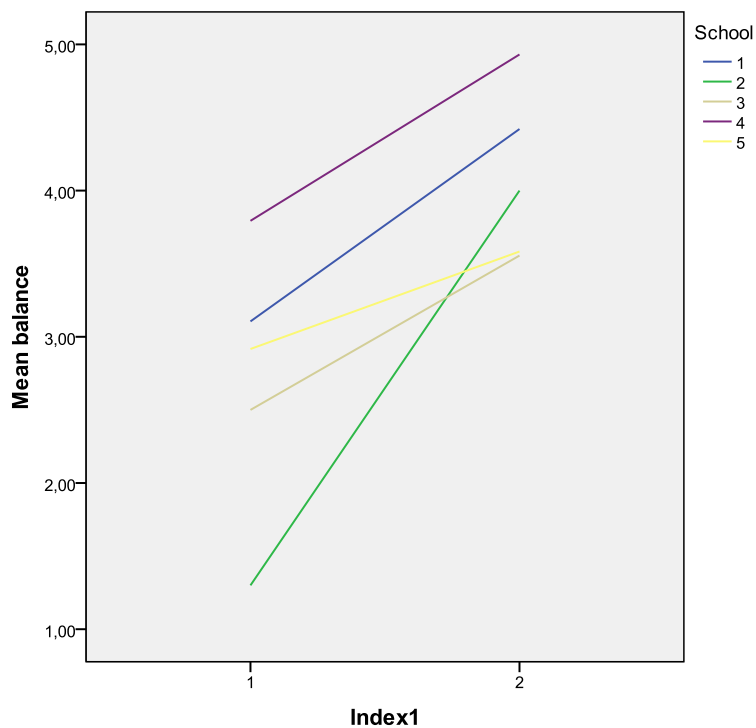


Figure 1 Mean Balance for all nurseries measured at two different time points.

In this figure the treatment nurseries are presented in the violet and blue line and the control group in the green, gray and yellow. The mean shows that the treatment nurseries have better results on both time 1 and 2. The progression of the green line is interesting and calls for further research. What happened in the nursery during the nine month period between tests?

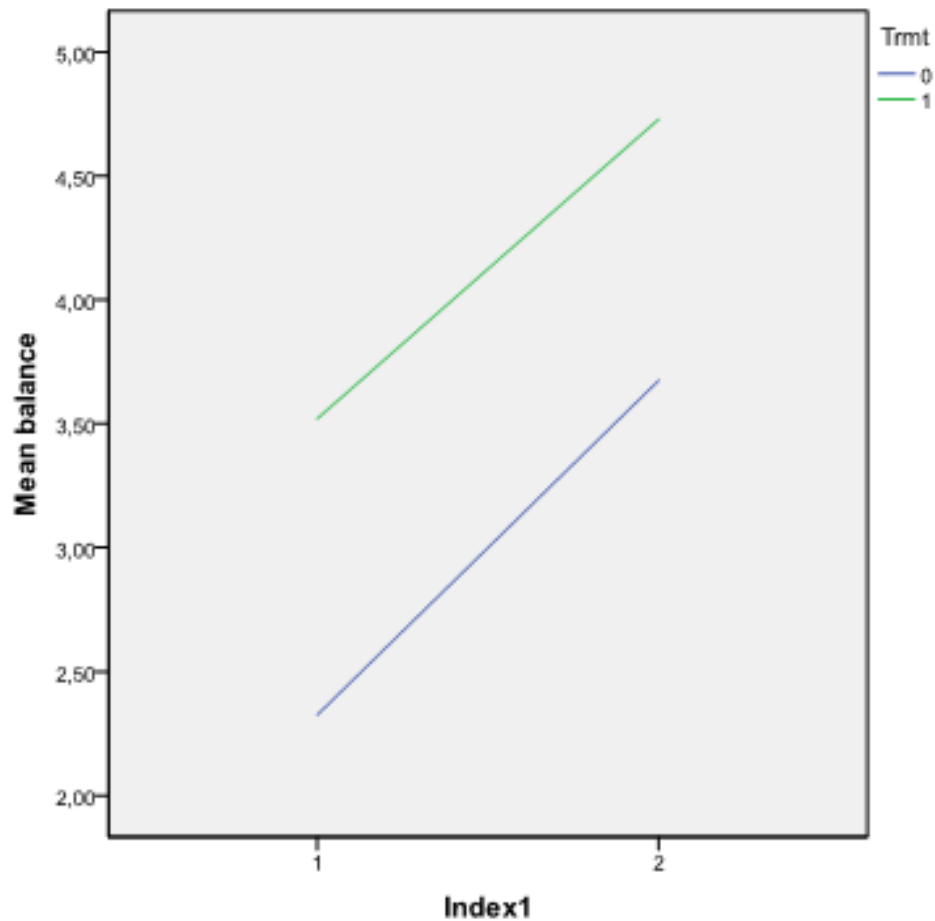


Figure 2 Mean Balance. Treatment and control group

In this figure we see the treatment nurseries, the green line, and the control nurseries, the blue line. We can clearly see that the treatment nurseries show better results on test days. The progression of the groups is similar. To see if there is a significant difference of progression we run an ANOVA test on the results.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	203,151 ^a	19	10,692	4,813	0
Intercept	1614,82	1	1614,82	726,858	0
Trmt	29,577	1	29,577	13,313	0
School(Trmt)	20,958	3	6,986	3,145	0,027
Gender	11,259	1	11,259	5,068	0,026
Month	54,952	10	5,495	2,473	0,009
Index1	71,326	1	71,326	32,105	0
Trmt * Gender	0,194	1	0,194	0,087	0,768
Gender * Index1	1,007	1	1,007	0,453	0,502
Trmt * Index1	0,023	1	0,023	0,01	0,919
Error	346,577	156	2,222		
Total	2848	176			
Corrected Total	549,727	175			

Figure 3. Statistics for Balance, all variables

The figure shows us that there is no significant difference between the two groups. There is no difference between the genders over time (Trmt*Gender) the significant is 0.768. There is also no significant difference between genders on test days (Gender) or on the main variable Treatment – Time (Trmt*Index1). The F column further strengthens that there is no significant difference on the Treatment * Time variable. Like Andy Field says in his book *Discovering Statistics Using SPSS*:

“If the value of F is less than 1, which immediately indicates that this contrast will not be significant.” (Field, 2005, p.352).

To take of all doubt if there is a difference we take the Treatment Gender (Trmt*Gender) and Gender Time (Gender*Index1) variables out of data to see if they interfere with the Treatment Time variable and run the ANOVA again.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	201,950 ^a	17	11,879	5,397	0
Intercept	1787,203	1	1787,203	811,951	0
Trmt	30,47	1	30,47	13,843	0
School(Trmt)	20,94	3	6,98	3,171	0,026
Gender	11,79	1	11,79	5,356	0,022
Month	55,62	10	5,562	2,527	0,008
Index1	71,401	1	71,401	32,438	0
Trmt * Index1	0,219	1	0,219	0,099	0,753
Error	347,777	158	2,201		
Total	2848	176			
Corrected Total	549,727	175			

Figure 4. Statistics for Balance, selected variable

Figure 4 shows us that there is no significant difference between the groups the significant is 0.753 and that tells us that there is no difference in the progression of motor development of balance over the nine moth period between tests.

3.2 Fine movement

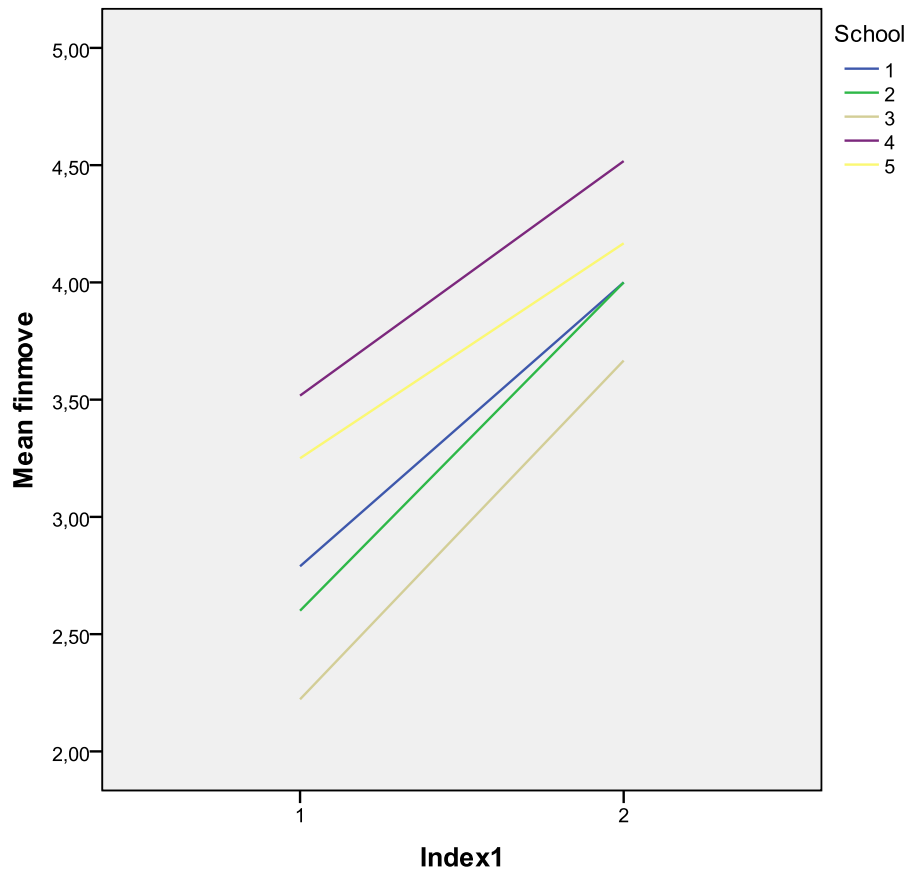


Figure 5. Mean Fine movement for all nurseries measured at two different time points.

As in figure 1 the mean from the treatment nurseries are presented in the blue and violet line and the control nurseries in the green, yellow and gray lines. It is interesting to see that a control nursery presented in the yellow line is showing better results than a treatment nursery presented in the blue line. All the Nurseries are showing progress in fine movement, so to see the difference between the treatment and control nurseries we combine the results and look at figure 6. This figure shows the linear progression of fine movement during the nine month period between tests for each of the five nurseries. The blue and violet lines represent the treatment nurseries and the green, yellow and brown represent the control nurseries. It is interesting that the nursery represented by the yellow line, a control nursery, is showing

better results than the blue line (a treatment nursery). Looking closely one can see that the yellow line is not showing the same progress as the blue or especially the green line. So we take a look at the Profile Plot when the nurseries are in the two groups in figure 6.

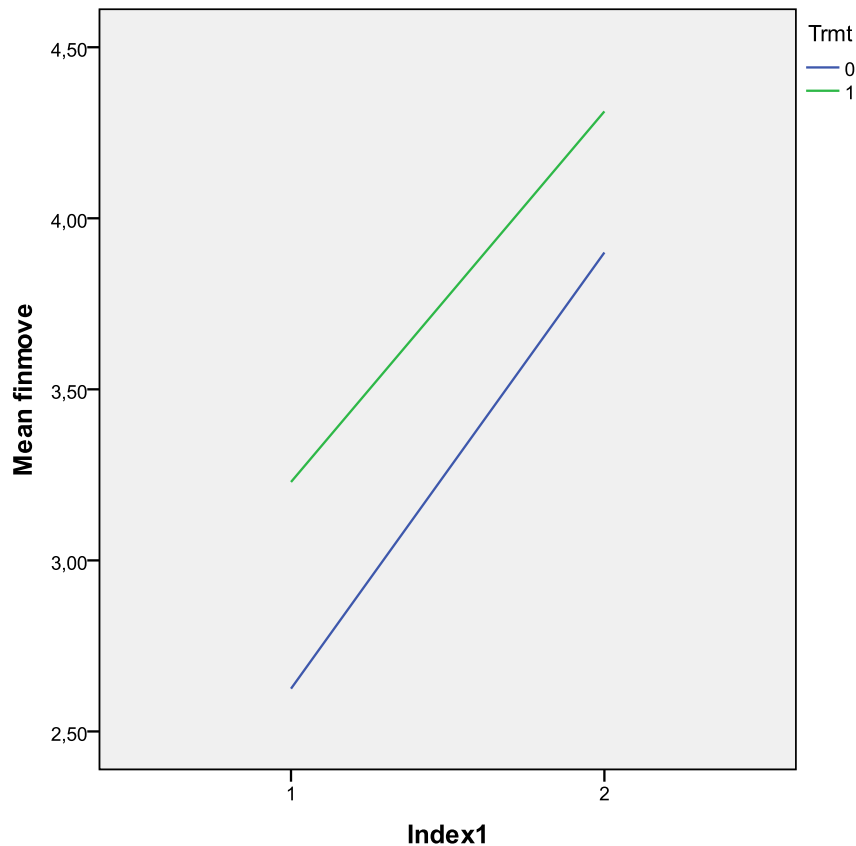


Figure 6. Mean for fine movement. Treatment and control group.

In this figure the treatment group is presented in the green line and control group in the blue line. The figure shows us that both groups are showing similar progress. To be sure if there is a significant difference we run the data with ANOVA.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	130,969 ^a	19	6,893	4,254	0
Intercept	1590,194	1	1590,194	981,476	0
Trmt	0,863	1	0,863	0,532	0,467
School(Trmt)	16,097	3	5,366	3,312	0,022
Gender	2,447	1	2,447	1,51	0,221
Month	40,3	10	4,03	2,487	0,009
Index1	60,668	1	60,668	37,444	0
Trmt * Gender	3,454	1	3,454	2,132	0,146
Gender * Index1	0,005	1	0,005	0,003	0,957
Trmt * Index1	0,342	1	0,342	0,211	0,647
Error	252,752	156	1,62		
Total	2589	176			
Corrected Total	383,722	175			

Figure 7. Statistics for Fine movement, all variables.

Figure 7 shows us the results from the ANOVA with all variables. We can see that the results are similar to the results in the test of balance. Treatment * Gender (Trmt*gender and Gender * Time (Gender*Index1) variables have no significant difference since $p < 0.001$. Therefore we do the same as previously, that is take them out to see if that has influence in the Treatment * Time variable. That shows no difference in this figure. Like in figure 3 and 4 the F value for Treatment * Time (Trmt*Index1) does not reach 1 so there is no difference on the variable.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	127,511 ^a	17	7,501	4,625	0
Intercept	1802,469	1	1802,469	1111,546	0
Trmt	1,298	1	1,298	0,801	0,372
School(Trmt)	14,012	3	4,671	2,88	0,038
Gender	3,246	1	3,246	2,002	0,159
Month	37,235	10	3,724	2,296	0,015
Index1	60,673	1	60,673	37,416	0
Trmt * Index1	0,401	1	0,401	0,247	0,62
Error	256,211	158	1,622		
Total	2589	176			
Corrected Total	383,722	175			

Figure 8. Statistics for Fine movement, selected variables.

Figure 8 shows us the same result as figure 7. There is no significant difference in the Treatment * Time (Trmt*Index1) variable because of $p < 0.001$. So taking out the two other variables has little effect on the result of Treatment * Time variable. As in previous figures of ANOVA we look at the F value for Treatment * Time (Trmt*Index1) variable and notice that it does not take value over 1 so there is no significant difference on the variable.

3.3 Gross movement

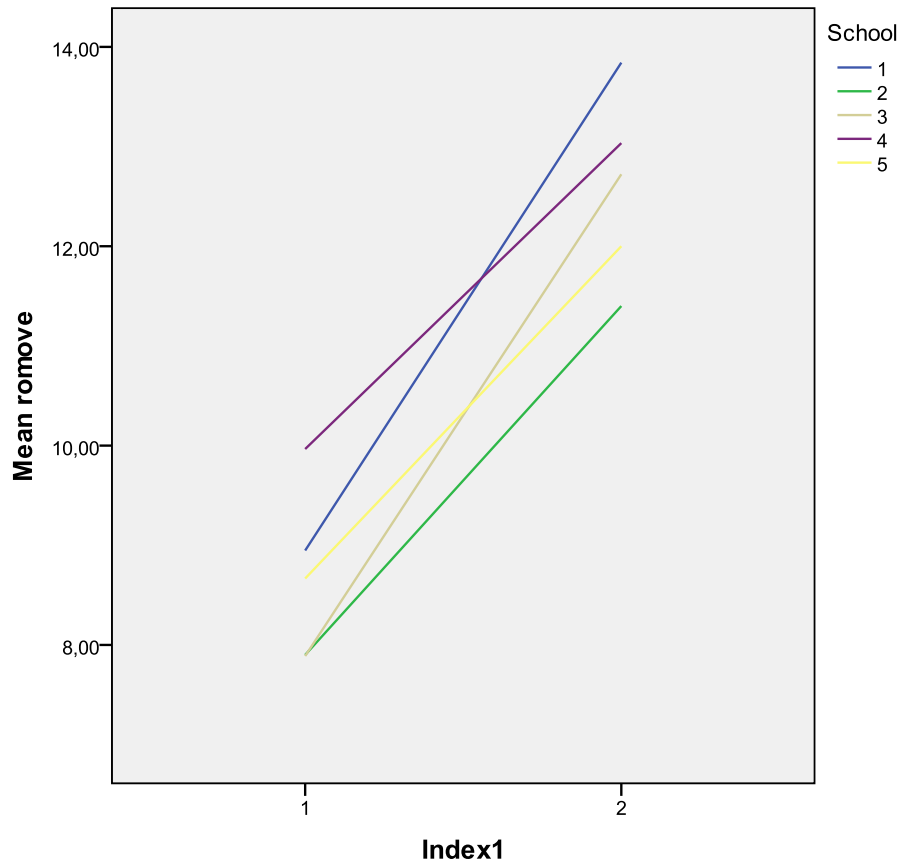


Figure 9. Mean Gross movement for all nurseries measured at two different time points.

As in previous figure with all Nurseries the treatment nurseries are presented in blue and violet lines while the control nurseries are gray, yellow and green. In this figure we can see a change. This figure shows different results than figure 1 and figure 5. In figure 1 and figure 5 the nursery presented in violet, is leading the nurseries in Balance and Fine movement. In figure 9 the nursery loses its leading possession in the second test. I had an opportunity to ask the headmaster of the nursery presented in the violet line if she had done any changes during the year, after doing the second test in her nursery. The answer was yes they increased the preparation for primary school. This is an interesting answer having the results in front of you. The gray line is also

interesting and it seems that the nurseries all have field's in which they have something special to offer.

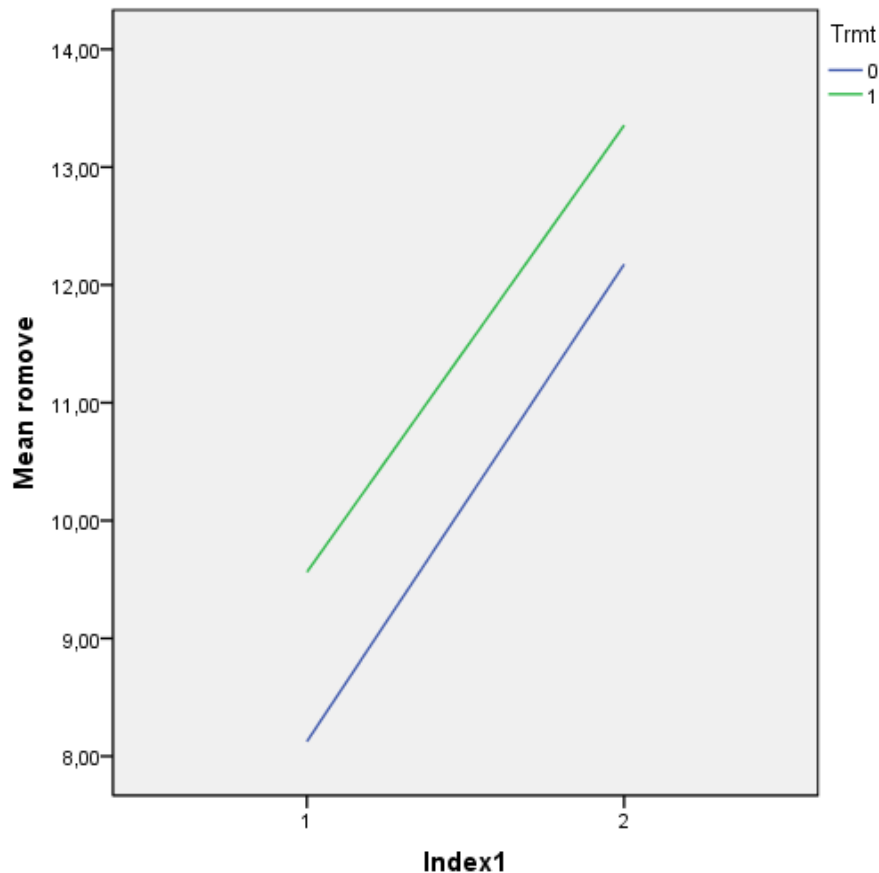


Figure 10. Mean for Gross movement. Treatment and control group

In Figure 10 we see the treatment nurseries together in the green line and the control group in the blue. The figure for gross movement tells us a similar story as figure 2 and figure 6. That is all the nurseries are showing good motor development in Gross movement. The progress of the groups is similar when one looks at the figure. So we turn to the statistical approach of the ANOVA and go to Figure 11.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	927,590 ^a	19	48,821	7,429	0
Intercept	15513,31	1	15513,31	2360,735	0
Trmt	41,005	1	41,005	6,24	0,014
School(Trmt)	5,472	3	1,824	0,278	0,842
Gender	0,114	1	0,114	0,017	0,895
Month	171,579	10	17,158	2,611	0,006
Index1	670,62	1	670,62	102,052	0
Trmt * Gender	5,235	1	5,235	0,797	0,373
Gender * Index1	0,684	1	0,684	0,104	0,747
Trmt * Index1	0,327	1	0,327	0,05	0,824
Error	1025,137	156	6,571		
Total	22724	176			
Corrected Total	1952,727	175			

Figure 11 Statistics for Gross movement, all variables.

Figure 11 shows us similar results as the statistics from Balance and Fine movement. The significant for Treatment * Gender (Trmt*Gender) and Gender * Time (Gender*Index1) and the variables show no significant difference, there is no significant difference either on the Treatment * Time (Trmt*Index1) variable. As in figures 3 and figure 7 we take the Treatment * Gender and Gender * Time variables out and run the data again. Let's turn to figure 12 and see if anything changes.

Source	Type III Sum of	df	Mean Square	F	Sig.
Corrected Model	921,671a	17	54,216	8,308	0
Intercept	17275,081	1	17275,081	2647,249	0
Trmt	44,818	1	44,818	6,868	0,01
School(Trmt)	4,129	3	1,376	0,211	0,889
Gender	0,383	1	0,383	0,059	0,809
Month	166,515	10	16,652	2,552	0,007
Index1	670,819	1	670,819	102,797	0
Trmt * Index1	0,728	1	0,728	0,112	0,739
Error	1031,056	158	6,526		
Total	22724	176			
Corrected Total	1952,727	175			

Figure 12. Statistics for Gross movement, selected variables.

As might be expected from former figures for Balance and Fine movement there is no significant change in the Treatment * Time (Trmt*Index1) variable because of $p < 0.001$. Interestingly in this figure, and in previous figures from ANOVA, the result on “Month” shows that there might be some differences between the measured tasks that makes it interesting to take a better look at in an another research. The F value continues to be under 1 so we continue to the results from the coordination test.

3.4 Coordination

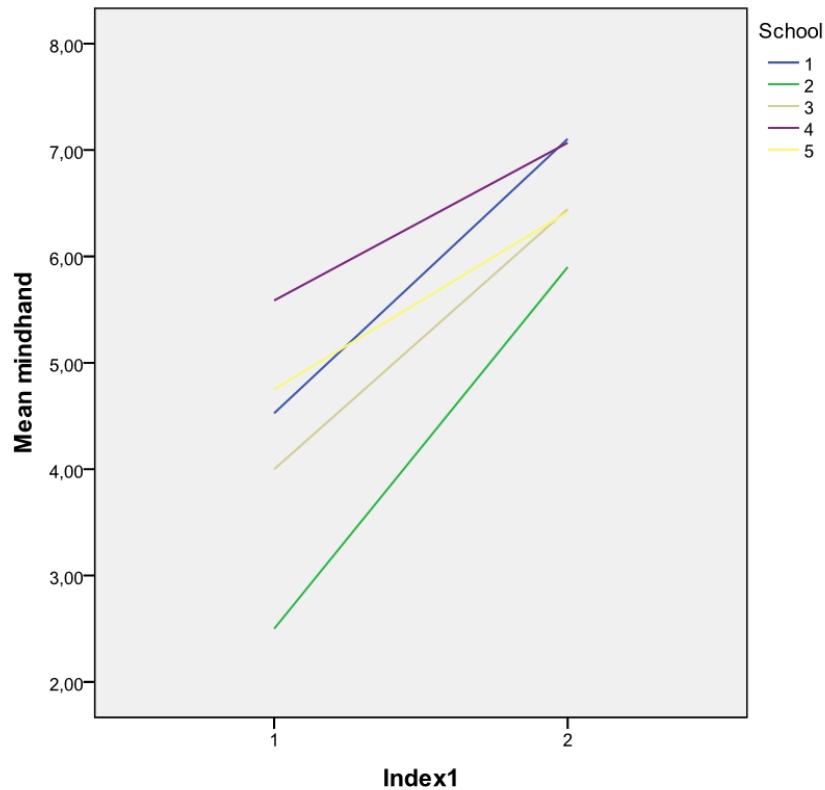


Figure 13. Mean Coordination for all nurseries measured at two different time points.

This figure shows the linear progression of coordination during the nine month period between tests for each of the five nurseries. The blue and violet lines represent the treatment nurseries and the green, yellow and brown represent the control nurseries. We can see that like in the figure from Gross movement (figure 9) the treatment nursery presented in blue is gaining a lot on the other treatment nursery presented in violet. It is also interesting that this same nursery (blue) is third on time 1 but first in time 2. This is interesting and calls for further information on how the emphasis was in the nursery during the nine month period.

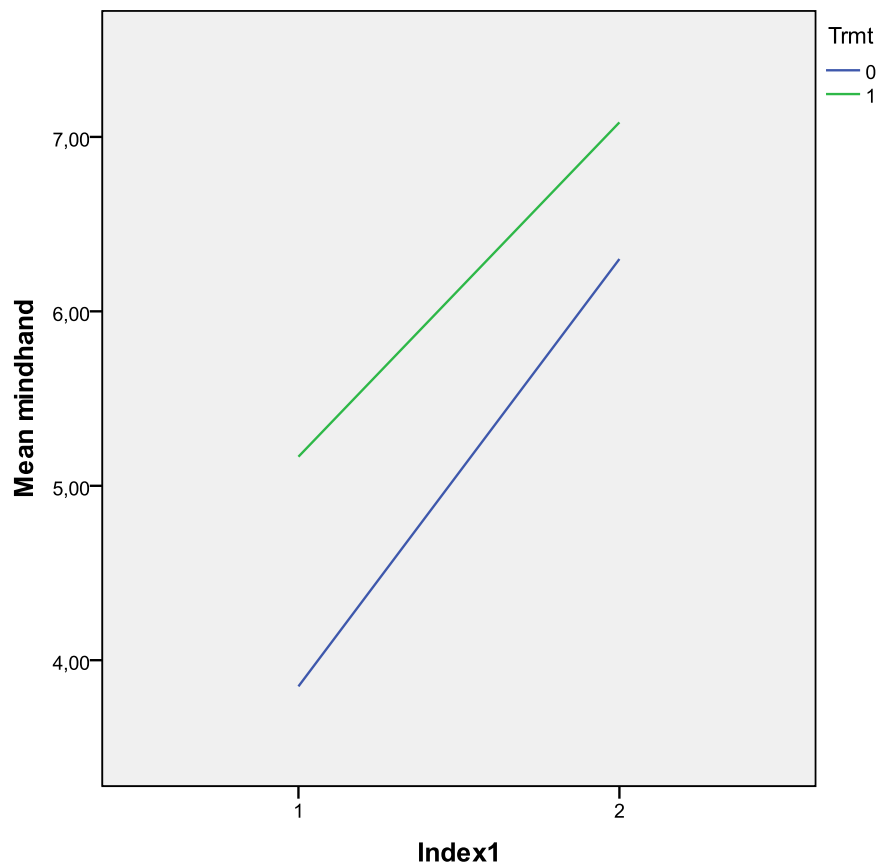


Figure 14. Mean for Coordination. Treatment and control group.

This figure shows the treatment nurseries in green and control nurseries in blue. The treatment nurseries hold their advantage during the period between the tests. This figure is not so different from figures 2, 6 and 10. They all show that the treatment nurseries lead in time 1 and time 2. But there is no visual difference on the progress of motor development. To take of all doubt we turn to statistics and look at figure 15.

Source	Type III Sum of				
	Squares	df	Mean Square	F	Sig.
Corrected Model	354,513a	19	18,659	7,509	0
Intercept	3987,515	1	3987,515	1604,691	0
Trmt	19,67	1	19,67	7,916	0,006
School(Trmt)	25,196	3	8,399	3,38	0,02
Gender	8,51	1	8,51	3,425	0,066
Month	48,67	10	4,867	1,959	0,041
Index1	207,915	1	207,915	83,671	0
Trmt * Gender	15,115	1	15,115	6,083	0,015
Gender * Index1	0,554	1	0,554	0,223	0,637
Trmt * Index1	2,143	1	2,143	0,863	0,354
Error	387,646	156	2,485		
Total	6356	176			

Figure 15. Statistics for Coordination, all variables.

As might have been expected there is no difference in the Treatment * Time (Trmt*Index1) variable because of $p < 0.001$. However, the Treatment * Gender (Trmt*Gender) measurement $p = 0.015$ is interesting and possibly worth a further look. As with previous figures we make sure that Treatment * Gender (Trmt*Gender) and Gender * Time (Gender*Index1) variables are not interfering with the Treatment * Time variable. We take out the Treatment * Gender and Gender * Time variables and run the data again. As in all other ANOVA figures the F value is lower than 1 so we will not get any significant difference on the variables in question.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	338,844 ^a	17	19,932	7,808	0
Intercept	4556,922	1	4556,922	1785,188	0
Trmt	23,919	1	23,919	9,37	0,003
School(Trmt)	19,971	3	6,657	2,608	0,054
Gender	11,636	1	11,636	4,558	0,034
Month	41,514	10	4,151	1,626	0,104
Index1	208,012	1	208,012	81,489	0
Trmt * Index1	3,103	1	3,103	1,216	0,272
Error	403,315	158	2,553		
Total	6356	176			
Corrected Total	742,159	175			

Figure 16. Statistics for Coordination, selected variables.

As in the other figures we do not get a significant difference in the Treatment * Time (Trmt*Index1) variable because of $p < 0.001$. In the results from the ANOVA we can not find any significant difference between the treatment and control groups in development during the period between testing day's. Here the F value is higher than 1 but all the same it does not give us significant on the Treatment * Time variable.

4. Discussion

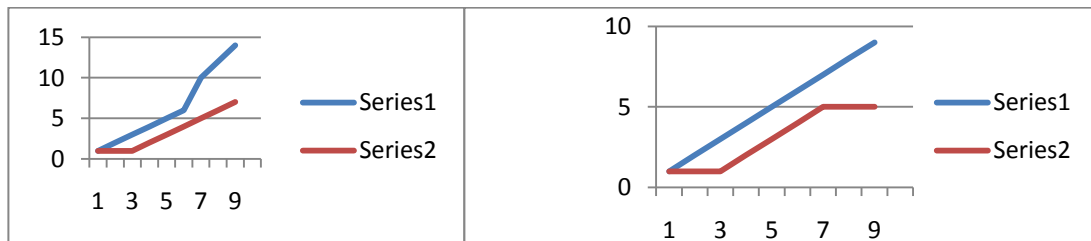
From those results we can say with 95% accuracy that this research shows no significant difference between the treatment nurseries and the control nurseries in balance, gross movement, fine movement or coordination of motor development over the nine month period. From the data we can also say that there is no difference between gender or month of birth in the research. The results show us that there is a difference between the treatment and control nurseries on both test days but we can not from the results say why or where this difference comes from.

The research did not show that the treatment nurseries had better progress than the control nurseries during the nine month period between the tests. The research tells us that the children in the treatment nurseries have significantly better results in the test on time 1 and time 2 in all the measured tasks. It (They) show(s) us the score that the nurseries got on the children's development over those months. The tables show us that the treatment nurseries score higher on the tests both in time 1 and time 2. That gives the children in the treatment nurseries better motor skills at the test days, but does not reveal where that advantage comes from. The result from the data also reveals that gender does not matter in that time period in a child's life.

From the results I can answer the research questions in the way that there is no difference in children's motor development, based on natural surroundings, over the nine month period of the research. Further more this research does not show difference in motor development between gender or birth month on the same period. The research shows us that the treatment

nurseries have better motor development on test days without telling us where this difference comes from.

The research calls for further work within the field. The results show us that the treatment nurseries show significantly better results on the testing days but they do not tell us anything about what happened before the first test day. It would be very interesting to follow the children through primary school to see how their development continues. Would I have found a difference in development over time if I had chosen to test the children born 2005 and test them again in two years? Is this a period where the children develop in a similar speed? Would the results be similar to either of the following figures that are an image of how the motor development could look like before and after the testing days.



Some of the results in the research are interesting. One of the control nurseries shows remarkable progress over the period in balance (figure 1). What happened there? Did the nursery take up new training and if so why did they do that? There is no secret that the teachers were aware of the test. Did they see what lacked with the children in the first test and start training the children? Was the program in the school set up in that way that balance was to be the main training during that period? I did not get any answers on my thoughts on these questions but I think they are relevant in the discussion chapter.

The MOT 4- 6 test comes with accurate guidelines of how to explain and what to say to the children, which puzzles to show and so on. There are puzzles that some of the children misunderstood. One was puzzle nr 2 (put as many dot's on the paper as you can, start when I say and don't stop until I tell you). The misunderstanding was that instead of making dots, some started to draw points and worked slowly spending time on every dot. What can explain this? Misunderstanding? Tone of voice? Rhythm of my voice? Another puzzle was puzzle nr 3 (pick up a handkerchief with your toes and give it to me). Instead of grapping the handkerchief with the toes the children would slide their foot under the handkerchief and pick it up that way. When it came to the fine movement puzzle, picking up matches by working with both hands at the same time, the score was very poor in the first test. My thoughts at that time were that it was a time wasted, they could not handle it. In the second round it was different. Not in the way that the children were scoring considerably higher but the attempts were much better and those that did not gather any points in that puzzle were close. In the first round the children used up to 2 minutes to finish the puzzle, while one to one and a half was the usual time in the second round. This change was something that I saw as an interesting change between tests. The results from puzzle thirteen and fourteen were also interesting. Puzzle number thirteen is a balance test but it is also a fine measure on ankle strength. In that puzzle the children from the experimental group were doing better. In puzzle fourteen, jumping a stride jump with rebound with arm clapping above head, the kids from Grænaborg were doing very well, and when I asked about it the headmaster told me that it was one of the practices that the kids did in their weekly classes over the winter. The same was interesting for puzzle nr eight, throwing a ball to hit a target, where kids from Álftaborg were doing well and the headmaster told me that a game where you throw a ball is very popular in the school and that the instructor is a handball trainer, a sport very popular in Iceland. This amongst other things comes to show that all encouragement helps and has a positive effect on children.

This research is not without limitations. One thing that I did not take into consideration in this research was the children's background. How does the family spend its time together? Does education of parents matter or the financial status of the family?

When I started the research I believed that I had chosen a very strong and liable test in the MOT 4- 6. I probably did, but the results give a reason to continue with research on what influences motor development. That may limit the strength of the MOT 4-6 because it is strongly aimed at four to six year old children. Another uncertainty or a possible weakness is the timing. Can it be that the timing of the test fell into a phase where the motor development is less than in other stages in life? The period between the tests is fall, winter and spring; does more of motor development occur over summer? Would a longer test give me a different result? Should the test have started when the children were four years old, and continue until the children were ten or twelve? Maybe and maybe that would give some clear answers on the research question.

To perform a research like the one described above, it would be necessary to develop a new test for motor development. A test that could measure the progression of motor development, and follow children's motor development from the age of four to fifteen. With a test like that a thorough research, where those weaknesses I counted earlier in this section, could be taken into account with a questionnaire that followed. We would at least be closer to some answers to my research question.

The theory that physical activity has a positive influence on learning seems to be well known amongst authorities and headmasters in the pre- and primary school in Iceland, but do the schools or the authorities act accordingly? That seems not to be the case. Looking at the curriculum there are supposed to be three 40 min sessions of physical activity during a week, one of them swimming. The school year in primary schools is 34 weeks and therefore there should be 102 sessions of physical activity during that time. A report

from the department of education from 2005 shows that over 40% of Icelandic primary school do not fulfill the recommended time for physical activity for children (Ministry of Education S. a., 2005). This does not include the nurseries but is an indicator of the emphasis on physical movement in the Icelandic schools system. A new curriculum for nurseries in Iceland is in an introductory phase. The big change in the education for nursery teachers is that the education will now be 180 ECTS, a five years study, and end with a MA degree instead of the 3 years BA degree (Education, 2011). The negative news regarding this change is that only 10 ECTS of 180 is marked to physical movement joined with expression, while 20 ECTS are in arts and another 20 for written language (Education, 2011). This priority is from my point of view wrong and in the introduction I made that opinion clear and on later opportunity followed that up by criticizing the new curriculum to the Minister of Education.

As a part time politician in Reykjavik I was a member of the Board of Nurseries in Reykjavik for a while. That job gave me an insight into the work done in the nurseries which I found in many cases fascinating and the imagination and power of the employees was considerable. The Nurseries vary from each other and have the liberty to make their own protocol and they do so. The board got an introduction to a new curriculum for the five year education of nursery teachers. That introduction opened my eyes to a problem that I had discovered when gathering data in the participating nurseries. The problem is lack of knowledge on how to plan and execute physical training for children. The work as a politician has also opened my eyes to possibilities to have an influence on city planning. For example some cities like Glasgow and Freiburg have started to plan their cities with more green spaces and thereby acknowledging research that indicates the positive influence of open green areas on the well being of humans. Reykjavik is making a new policy for open areas and playgrounds for children. That policy is not yet ready but it will probably include the use of landscape instead of equipment. This policy is interesting, not because it is wrong but because it,

amongst other things, seeks support in the research of Ingunn Fjørtoft (2004), where she reports increased motor development in children in nurseries with more green area and fewer organized play areas (Fjørtoft, *Landscape as Playscape*, 2004). This new policy has more to do with cutting costs because of expensive equipment and maintenance. The last twenty years or so the mainstream in building Nursery yards and forming the playground has been with focus on safety, the landscape flat and easy to go about. The toys have been coming from standards, set by adults for children. The focus has been to eliminate the risk of children getting hurt. Fine gesture but what do we lose by doing this? Safety, especially safety for children, is not something to be taken lightly. In a study from Australia Little & Wyver (2005) discuss the inability of many early childhood educators to provide challenging and stimulating outdoor experiences to children due to restrictive regulations and cultural emphasis on eliminating or minimizing physical risk. The authors review the difference between “hazard” and „risk“ and emphasize the importance of considering risk within the larger context of children’s development, as well as the need to focus on identifying and fostering a risk balance that is appropriate for each individual child (Little & Wyver, 2008).

There is always a light at the end of the tunnel. There are some positive things happening in Iceland and one of those is the outdoor classroom, a teaching method whose aim is to teach every item of the curriculum in an outdoor environment. In his book *Klasserommet utenfor* (The Outdoor Classroom) Arne Nikolaisen Jordet (2010) goes thoroughly through the method and meaning of the outdoor classroom. If nothing else, the method gives the children a chance to get some knowledge of their surroundings and ways to enjoy the outdoors (Jordet, 2010). The signs of too little outdoor play and activity are expressed in a special way by Gunnar Breivik (2001), rector of the Norwegian University of Sports in Oslo, in his book “Sjuk I magen og livskvalitetet” (Sick in the stomach and quality of life), describing his own youth and worries for the future. Interestingly he names that his worries are mostly that children are playing less outdoors. He hypothesize that fewer

visits to the emergency room are not because the environment is safer, but because children play less outdoors and the environment is less challenging than it was. He also claims that it is every child's right to break a limb (Breivik, 2001). Well let's hope it does not come to that before we dare to take on the project of researching what best influences children's motor development. There is a fine line between hazard, safety and learning by doing and that is the line everyone would like to find.

Doing this research has been a pleasure. A pleasure because both gathering the data and looking through a large quantity of research to find suitable references for the paper has been enlightening on the subject. It is quite interesting how little research has been done on what really influences children's motor development. In a newsletter from the Children & Nature Network from 2008 comes the following sentence that I found describing the problem of finding resources on the research question:

Among researchers, interest in the relationship of nature experience to human health cognition, creativity and well-being is growing, but research is limited – and much of it has been conducted within the past few decades. Therefore, some cautionary notes: Findings on outdoor play often mingle types and activates, such as bicycle riding in the neighborhood, with findings more specific to the nature experience. There is a need for more rigorous, controlled studies in order to make confident statements about correlation, cause and effect. (C&NN, 2008, p.10).

There is a lot of research material that tells us that all stimulating treatment for physical movement has positive influence on the children's motor development but none that I found that is trying to dig deeper and to isolate what has influence on what in motor development.

Growing interest in the effects of nature on children and their well-being, especially in the US, is something that I expect to change and one can already see big changes on the homepage of the Children and Nature Network organization and a growing amount of research on the matter that are taking place and have taken place in the last couple of years.

The research shows that there is something that makes a difference in the progress of children's motor development. In the research I tried to isolate that difference to the effect of nature as indicator for motor development, but received mixed results. There is an unexplained difference between the children in the treatment and control group. At the same time there are research showing that nature has a positive influence on children's development. Further research has to be more focused on indicators and have more background information to work with. Further research has to try to find out what influences what in children's motor development. Nature and natural surroundings are a part of what has to be included in future research.

There is information from research on the positive influence of natural surroundings on children with ADD, ADHD and BMI (Faber Taylor, 2008; Cleland, 2008). Those research call for a change. Change in the educational system and a change in future city planning.

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Appendix

5.1 Request for approval for the test

Undirritaður óskar hér með eftir leyfi leikskólasviðs til að framkvæma hreyfiproska próf í þremur af leikskólum Reykjavíkurborgar Rauðhól, Álftaborg og Grænuborg. Prófin eru hluti af Meistararitgerð minni frá Háskólanum í Reykjavík. Í rannsókninni er ég að kanna hvort munur er hreyfiproska barna sem fá að vera í útideild Rauðhólss í Norðlingaholti og hinna leiksólanna.

Hvert próf tekur um 20 mín. og pláss í næði til að framkvæma prófin. Ætlunin er að kanna hreyfiproska hjá elsta árgangi leikskólana og mun prófin fara fram vorið 2009 og aftur vorið 2010.

(PS Rofaborg and Ásborg were later added to the approval to increase the numbers of children in the test. The authorities thought it unnecessary to send a new letter)

Með kveðju

Hermann Valsson

Appendix 5.2 Letter of approval

Tilvísun

í

mál:

MSR2009060062

Reykjavík, 9. júní 2009

MSR2009060062

Háskólinn
Hermann

í

Reykjavík
Valsson

Ofanleiti

2

103

REYKJAVÍK

Efni:

***Leyfi til að gera hreyfiþroskapróf í
þemur leikskólum í Reykjavík***

Leikskólasvið Reykjavíkur heimilar fyrir sitt leyti að ofangreind athugun fari fram í leikskólum Reykjavíkur að því tilskildu að eftirfarandi skilyrðum sé fullnægt:

1. Að fyllsta trúnaðar sé gætt.
2. Að viðkomandi leikskólastjórar heimili athuginina.
3. Að foreldrum verði kynnt rannsóknin og þeim gefinn kostur á að hafna þátttöku fyrir hönd barna sinna.

Þar sem við viljum gjarnan hafa yfirlit yfir þær rannsóknir sem gerðar eru í leikskólum Reykjavíkur óskum við eftir því að fá sent eintak af rannsóknarskýrslunni eða útdrátt úr henni.

Með kveðju
Hildur Björk Svavarsdóttir
deildarstjóri tölfraeði- og rannsóknarþjónustu

Appendix 5.3 Letter to parents

Reykjavík 15. júní 2009.

Ágæti foreldri/forráðamaður

Ég heiti Hermann Valsson og er nemandi við Lýðheilsudeild Háskólans í Reykjavík. Ég hef valið að lokaverkefni mitt til MPH gráðu fjalla um Hreyfiproska barna í leikskólum. Í rannsókninni ætla ég að reyna að finna svar við því hvort umhverfi leikskóla hafi áhrif á hreyfiproska barna. Ransóknin byggir á hreyfiproskaprófi sem heitir MOT4 og yrði prófið tekið tvisvar á árinu nú í byrjun júlí og aftur að ári liðnu. Leikskólasvið hefur þegar veitt sitt samþykki og vona ég að þú veitir samþykki þitt fyrir þátttöku þíns barns í rannsókninni.

Með kveðju

Hermann Valsson

Undirritaður foreldri/forráðamaður _____ kt.
_____ samþykki að nemandinn taka þátt í ransóknarverkefni um hreyfiproska barna í leikskólum Reykjavíkur.

Appendix 5.4 The MOT 4-6

Verkefni 1: Stökk inn í gjörð (upphitunarverkefni)

Áhöld: Ein gjörð (þvermál 70 sm).

Lýsing: Barnið á að hoppa jafnfætis úr stöðu inn í gjörð sem liggur á gólfinu og strax aftur út úr henni, án þess að snerta hana. Bæði hoppin eiga að vera í sömu átt.

Leiðbeiningar: „Getur þú stokkið samtímis með báða fætur inn í gjörðina og áfram út úr henni án þess að snerta hana“.

Mat: Verkefnið er ekki metið til stiga, þar sem tilgangur þess er að aðlagja barnið að prófaðstæðum.

Verkefni 2: Jafnvægi áfram

Áhöld: Merking á gólfinu (borði eða límband) sem er 2 m að lengd og 10 sm að breidd.

Lýsing: Barnið á að ganga áfram á línu eða striki sem er 2 m að lengd og 10 sm að breidd. Það ræður sjálft skrefalengdinni. Barnið á ekki að fara út fyrir línurnar. Það fær tvær tilraunir sem báðar verða metnar.

Ábending: Barnið á að vera berfætt.

Leiðbeiningar: „Getur þú gengið eftir línunni? Reyndu að setja fætuna þannig á línuna að þeir fari ekki út fyrir línuna“.

Mat: 0 stig: engin heppnuð tilraun
1 stig: 1 heppnuð tilraun
2 stig: 2 heppaðar tilraunir

Verkefni 3: Setja punkta á blað

Áhöld: Einn breiður tússpenni, 1 A-4 blað, skeiðklukka, borð, stóll.

Lýsing: Barnið situr við borð. Á 10 sek. á það að setja eins marga punkta á blaðið fyrir framan sig með tússpennanum og það getur. Barnið má dreifa punktum að vild á blaðið. Leiðbeinandi (kennari) sýnir barninu fyrst hvað það á að gera.

Ábending: Olnbogi á að liggja á borðinu, svo að hreyfingin verði ekki gerð með öllum handleggnum, sem leiðir til hægari hreyfinga. Tilraunin er metin þó barnið fylgji ekki þessum fyrirmælum.

Leiðbeiningar: „Taktu tússpennann og reyndu að gera eins marga punkta á blaðið eins og þú getur, mundu að reyna að gera þetta hratt. Láttu handlegginn liggja á borðinu. Reyndu að dreifa punktum svo ég geti talið þá á eftir. Þú mátt setja punkta á blaðið þangað til ég segi stopp. Byrjaðu núna“.

Mat: 0 stig: 26 eða færri punktar
1 stig: 27-37 punktar
2 stig: 38 eða fleiri punktar

Verkefni 4: Taka vasaklút upp með tánum

Áhöld: Einn vasaklútur úr líni/bómull

Lýsing: Barnið stendur á gólfinu. Í 20 sm fjarlægð frá öðrum fætinum er útbreiddur vasaklútur. Barnið á að taka vasaklútinn upp með tánum og rétta leiðbeinandanum hann. Hver tilraun má ekki taka lengri tíma en 5 sek. Leiðbeinandi tekur við klútnum þegar barnið heldur honum í hnéhæð. Síðan verður það sama reynt með hinum fætinum.

Leiðbeiningar: „Reyndu eins hratt og þú getur að taka vasaklútinn upp með tánum og gefa mér hann. Ég legg hann síðan á gólfid og þú reynir það sama með hinum fætinum“.

Mat: 0 stig: engin heppnuð tilraun
1 stig: 1 heppnuð tilraun með hægri eða vinstri fæti
2 stig: 1 heppnuð tilraun með hægri og vinstri fæti

Verkefni 5: Hliðarhopp yfir sippuband

Áhöld: Eitt sippuband og skeiðklukka.

Lýsing: Tveggja metra langt sippuband er brotið fjórfalt saman (lengd 50 sm) og lagt á gólfid. Barnið stendur til hliðar við sippubandið og á að reyna að hoppa jafnfætis eins oft og það getur yfir sippubandið á 10 sek. án þess að snerta það. Skiptin eru talin. Ef sippubandið er snert eða hoppað á öðrum fæti er ekki talið.

Ábending: Þegar verkefnið er sýnt skal leiðbeinandi leggja áherslu á að hoppa verði jafnfætis.

Leiðbeiningar: „Stattu til hliðar við sippubandið eins og ég geri“, Leiðbeinandi sýnir. „Getur þú hoppað hróð hliðarhopp yfir sippubandið án þess að stíga á það? Reyndu að hoppa þangað til ég segi stopp. Byrjaðu núna“.

Mat: 0 stig: 7 eða færri hopp
1 stig: 8-11 hopp
2 stig: 12 eða fleiri hopp

Verkefni 6: Grípa prik

Áhöld: Prik (80 sm að lengd), sem skipt er niður í fjögur 20 sm svæði með litum.

Lýsing: Barnið stendur fyrir framan leiðbeinanda með ríkjandi hendina útrétta. Leiðbeinandi heldur þannig á prikinu að neðsti endi þess er í hæð við þumal- og vísingur barnsins, en bilið verður að vera 1 sm svo prikið geti fallið í gegn um hendina. Leiðbeinandi lætur prikið falla án þess að gefa sérstakt merki. Barnið verður að reyna að grípa það um leið og leiðbeinandinn hefur sleppt hendinni af því. Ekki má nota hina höndina. Barnið fær tvær tilraunir og betri tilraunin gildir.

Ábending: Hjá mjög lágum börnum getur prikið verið komið á gólfid áður en barnið grípur það. Í vafa tilfellum ætti leiðbeinandinn að athuga það nánar hvort prikið snertir gólfid þegar barnið snertir fjórða svæði þess. Ef svo er ætti barnið að stilla sér upp á kassa eða bekk meðan það gerir þessa æfingu.

Leiðbeiningar: „Strekktu handlegginn út til mín. Prikið sem ég held á, á að renna í gegnum hendina á þér. Rétt bráðum ætla ég að sleppa prikinu og þú verður að reyna að grípa það eins fjótt og þú getur. Þú mátt ekki nota hina höndina“.

Mat: 0 stig: gripið um svæði 4 eða prikið datt í gólfid
1 stig: svæði 2 eða 3 gripið
2 stig: svæði 1 gripið

Verkefni 7: Leggja tennisbolta í kassa

Áhöld: 3 tennisboltar, 2 litlir kassar, skeiðklukka.

Lýsing: Í kassa sem liggur á gólfinu eru 3 tennisboltar. Í fjöggra metra fjarlægð er annar kassi. Barnið á að taka einn bolta í einu og reyna eins fljótt og það getur að hlaupa með hann í hinn kassann þangað til allir boltarnir eru komnir í tóma kassann. Tíminn sem barnið þarf til þess að leysa þetta verkefni er tekinn.

Ábendingar: Ef barn kastar bolta í kassa verður að minna það á að leggja verður boltann í kassann, af því að boltarnir eiga að liggja í kassanum. Verkefninu er lokið þegar allir boltarnir liggja í hinum kassanum, tíminn er tekinn um leið og þriðji boltinn er kominn í kassann.

Leiðbeiningar: „Þú átt að taka einn bolta í einu úr þessum kassa og koma þeim eins fljótt og þú getur í hinn kassann“.

Mat: 0 stig: 15 sek. eða lengur
1 stig: 14-12 sek.
2 stig: 11 sek. eða skemmri tími

Verkefni 8: Jafnvægi aftur á bak

Áhöld: Búin er til lína á gólfið (borði/límband) sem er 2 m að lengd og 10 sm að breidd. Sömu áhöld og í 2. verkefni.

Lýsing: Barnið á að reyna að halda jafnvæginu aftur á bak á línu eða striki sem er 2 m að lengd og 10 sm að breidd. Barnið ræður skrefastærð sjálft en það má ekki stíga út fyrir merkinguna.

Ábendingar: Barnið á að gera þessa æfingu berfætt.

Leiðbeiningar: „Reyndu að ganga aftur á bak á línunni án þess að ganga út fyrir merkinguna“.

Mat: 0 stig: engin heppnuð tilraun
1 stig: 1 heppnuð tilraun
2 stig: 2 heppnaðar tilraunir

Verkefni 9: Skot á spjald

Áhöld: Spjald sem er 40 sm í þvermál, einn tennisbolti

Lýsing: Barnið á að reyna að hitta spjald sem er fest á vegginn í 170 sm hæð (mælt frá gólfi að efri rönd) úr 3 m fjarlægð. Barnið fær fjórar tilraunir. Tilraun er gild þótt boltinn snerti eingöngu spjaldröndina.

Ábendingar: Spjaldið og veggurinn verða að vera í ólíkum litum, t.d. ljós veggur og dökkt spjald. Leiðbeinandi ætti að standa fyrir aftan barnið á meðan það kastar, frá þessu sjónarhorni á hann auðveldast með að dæma hvort barnið hittir spjaldið eða ekki.

Leiðbeiningar: „Reyndu að hitta spjaldið með boltanum. Þú hendir frá þessu striki“.

Mat: 0 stig: engin hittni
1 stig: hitti í sitt skipti
2 stig: hitti 2-4 sinnum

Verkefni 10: Safna saman eldspýtum

Áhöld: Askja með 40 eldspýtum, skeiðklukka.

Lýsing: Barnið situr við borð, þar sem tvær hrúgur með jöfnum fjölda af eldspýtum liggja sitt hvoru megin við öskjuna, bilið á að vera 15 sm. Báðar hendurnar eiga að vinna samtímis að því að safna eldspýtunum saman í öskjuna. Aðeins má taka eina eldspýtu með hendinni í einu. Hvetja skal barnið til þess að nota báðar hendur í einu. Leiðbeinandinn sýnir barninu hvernig það gengur. Tíminn sem fer í að leggja allar eldspýturnar í öskjuna er tekinn.

Ábendingar: Leiðbeinandinn ætti að merkja á borðið hvar hrúgurnar eiga að vera, 15 sm hægra og vinstra megin við öskjuna svo ekki þurfi að mæla í hvert skipti ef endurtaka þarf verkefnið.

Leiðbeiningar: „Geturðu lagt þessar eldspýtur í öskjuna? Til þess verður þú að nota báðar hendur samtímis, en taktu aðeins eina eldspýtu í hvora hönd og legðu hana snyrtilega í öskjuna. Gerðu þetta eins fljótt eins og þú getur“.

Mat: 0 stig: 71 sek. eða lengur
1 stig: 54-70 sek.
2 stig: 53 sek. eða skemmri tími

Verkefni 11: Smeygja sér í gegnum gjörð

Áhöld: Ein gjörð sem er 70 sm í þvermál.

Lýsing: Barnið á að smeygja sér í gegnum gjörð sem er haldið upp á kant af leiðbeinanda. Á meðan það smeygir sér í gegnum gjörðina má það hvorki snerta gólfið né snerta gjörðina með líkamanum. Síðan er það sama endurtekið frá hinn hliðinni. Báðar tilraunir eru metnar.

Ábendingar: Leyfilegt er að smeygja sér í gegn á tvo vegu, í fyrsta lagi með aðra hliðina á undan og í öðru lagi með andlitið andspænis gjörðinni.

Leiðbeiningar: „Geturðu smegt þér í gegnum gjörðina sem ég held á? Gerðu þig lítinn/litla svo þú hvorki rekist í gjörðina né þurfir að styðja þig með höndunum á gólfið. Reyndu þetta fyrst frá þessari hlið og síðan frá hinn hliðinni“.

Mat: 0 stig: engin heppnuð tilraun
1 stig: 1 heppnuð tilraun
2 stig: 2 heppnaðar tilraunir

Verkefni 12: Hopp á öðrum fæti inn í gjörð

Áhöld: Gjörð sem er 70 sm í þvermál, skeiðklukka.

Lýsing: Barnið stendur u.þ.b. eitt fet frá gjörðinni, sem liggur á gólfinu, hoppar á öðrum fæti inn í gjörðina verður að lenda á stökkfæti og standa á honum í 5 sek. án þess að setja hinn fótinn niður. Tvær tilraunir eru fyrir hvorn fót. Allar tilraunir eru metnar. Leiðbeinandi sýnir hvað á að gera.

Ábendingar: Leyfilegt er að gera jafnvæghreyfingar með örmunum og stíga lítillga fram og til baka á stöðufæti. Tilraunin er ógild um leið og óvirki fóturinn er notaður.

Leiðbeiningar: „Geturðu hoppað á öðrum fæti inn í gjörðina og staðið á stökkfætinum þangað til ég segi stopp? Gerðu það sama með hinum fætinum“.

Mat: 0 stig: engin heppnuð tilraun
1 stig: 1-2 heppnaðar tilraunir
2 stig: fleiri en 2 heppnaðar tilraunir

Verkefni 13: Grípa tennishring

Áhöld: Einn tennishringur (gúmmihringur).

Lýsing: Barnið á að grípa tennishring með báðum höndum sem hent er til þess úr 4 m fjarlægð. Við gripið má hringurinn hvorki snerta brjóstið né kviðinn. Henda skal hringnum í boga til barnsins. Mistekst kastið er tilraunin ekki gild og henda skal að nýju. Ein æfing er leyfð, sem ekki má telja sem tilraun. Alls eru þrjár tilraunir.

Ábendingar: Þetta verkefni er háð nákvæmu kasti leiðbeinanda. Í vafatilvikum ætti að endurtaka kastið.

Leiðbeiningar: „Ég hendi þessum hring til þín og þú átt að reyna að grípa hann með báðum höndum. Strekktu handleggjina út svo þú getir gripið hringinn áður en hann lendir á kviðnum á þér. Fylgstu með, núna hendi ég hringnum“.

Mat: 0 stig: engin heppnuð tilraun
1 stig: ein heppnuð tilraun
2 stig: fleiri en 1 heppnuð tilraun

Verkefni 14: Sprellikallahopp

Áhöld: Skeiðklukka.

Lýsing: Barnið á að hoppa sprellikallahopp í 10 sek. Handa- og fótahreyfingar verða að vera í takt, bæði sundur og saman, klappa lófnum saman yfir höfðinu. Ekki er leyfilegt að hvíla sig á milli hoppa. Leiðbeinandinn sýnir hreyfinguna.

Ábendingar: Mikilvægt að taktinum sé haldið við útfærsluna.

Leiðbeiningar: „Þekkir þú sprellikallahopp? Reyndu að láta faturna lenda fyrst langt hvor frá öðrum og síðan nálægt hvor öðrum. Getur þú samtímis klappað höndunum saman fyrir ofan höfuð og síðan klappað þeim á lærin? Fylgstu með, ég sýni þér hvernig þetta gengur. Reyndu núna að hoppa svona þangað til ég segi stopp...“

Mat: 0 stig: getur ekki sprellikallahopp
1 stig: - að hluta til rétt, en gat ekki haldið út tímann
- samhæfing hreyfinga var rétt, en missti niður taktinn
- takturinn réttur, en samhæfing hreyfinga er slæm
2 stig: taktur og samhæfing hreyfinga er góð, hélt út tímann

Verkefni 15: Stökk yfir snúru

Áhöld: Stóll eða borð (keilustangir), snúra.

Lýsing: Snúra er spennt á milli stóls og leiðbeinanda í 35 sm að hæð. Barnið hoppar jafnfætis úr 35 sm fjarlægð sem er merkt á gólfið yfir snúruna og reynir að komast yfir hana án þess að snerta hana. Síðan verður hæðin hækkuð í 45 sm. Tvær tilraunir eru við hvora hæð og besta tilraunin er metin.

Ábendingar: Til þess að hindra fall barnanna er snúran aðeins fest öðrum megin, leiðbeinandinn heldur hinum megin.

Leiðbeiningar: „Geturðu hoppað samtímis yfir snúruna með báða fætur, án þess að snerta hana? Hoppaðu frá þessu striki“.

Mat: 0 stig: ekkert heppnað stökk
1 stig: stokkið yfir 35 sm
2 stig: stokkið yfir 45 sm

Verkefni 16: Veltur um lengdarás líkamans

Áhöld: Engin

Lýsing: Barnið liggur á bakinu á gólfinu. Armar eru strektir fyrir ofan höfuð. Með spenntum líkama veltir barnið sér á kviðinn, síðan aftur á bakið o.s. frv. án þess að missa niður spennuna. Síðan er sami snúningur endurtekin en nú til hinnar hliðar. Báðar tilraunir verða metnar.

Leiðbeiningar: „Leggstu á bakið og strektu armana upp fyrir höfuð. Gerðu þig stífa/stífan og reyndu að velta þér til hliðar þar til þú kemur aftur á bakið. Handleggir eiga að vera fyrir ofan höfuð. Reyndu að vera stífur/stíf á meðan þú veltir þér“.

Mat: 0 stig: engin heppnuð tilraun
1 stig: 1 heppnuð tilraun
2 stig: 2 heppnaðar tilraunir

Verkefni 17: Standa upp og setjast niður með bolta

Áhöld: Bolti sem er 16 sm í þvermál.

Lýsing: Barnið situr með krosslagða fætur á gólfinu og heldur á bolta með báðum höndum fyrir ofan höfuð. Barnið á að standa upp án þess að breyta stöðu boltans og setjast aftur niður.

Ábendingar: Ekki þarf að rísa upp í cinni sveiflu, heldur er hægt að mjaka sér hægt og rólega upp með því að rugga sér fram og til baka. Í stöðu mega fæturnir vera samhliða. Á meðan barnið er að rétta úr sér má það halla efri hluta líkamans fram, en boltinn verður að vera á sínum stað.

Leiðbeiningar: „Sestu með krosslagða fætur á gólfið og haltu á boltanum með báðum höndum fyrir ofan höfuð. Geturðu staðið upp án þess að færa boltann? Geturðu sest aftur í klæðskerasetu (með krosslagða fætur)“.

Mat: 0 stig: gat hvorki staðið upp né sest
1 stig: gat annaðhvort staðið upp eða sest
2 stig: gat bæði staðið upp og sest

Verkefni 18: Snúningsstökk inn í gjörð

Áhöld: Gjörð

Lýsing: Barnið á að hoppa úr stöðu fyrir framan gjörðina jafnfætis með snúningi 180° inn í gjörð sem liggur á gólfinu og með öðrum 180° snúningi aftur út úr gjörðinni í upphafsstöðu (barnið er þá búíð að snúa sér í heilan hring). Barnið ræður í hvora áttina það snýr. Leiðbeinandi ætti að aðstoða barnið við að velja átt og nota sig sjálfan sem viðmiðun. Leiðbeinandi sýnir barninu hvað það á að gera. Barnið fær tvær tilraunir sem verða báðar metnar.

Leiðbeiningar: „Hoppaðu inn í gjörðina og snúðu þér þannig að þú getur séð mig (leiðbeinandinn stendur fyrir aftan barnið þegar það hoppar af stað) þegar þú lendir. Hoppaðu síðan út úr gjörðinni þannig að þú snúir baki í mig þegar þú lendir“.

Mat: 0 stig: engin heppnuð tilraun
1 stig: 1 heppnuð tilraun
2 stig: 2 heppnaðar tilraunir

MOT 4-6

KENTTALA: _____ ALBUR: _____

ALDUR: -

H/ED: _____ PYNGD: _____

Nr.	Verkefni	Tími	Úrvinsla	P.	Athugasemdir
15.	Stökð yfir snúru (2 tilvarnt 4 hvora lína)		0 Ekki heppnið nátt. 1 Stökð yfir 31 sm. 2 Stökð yfir 42 sm.		
16.	Veltur um lengdarás líkamans		0 Engin heppnið tilraun 1 heppnið tilraun 2 2 heppnið tilraunir		
17.	Stökð upp og sest niður, hola haldið í seilingu (Lækrímboati, 16 sm ø)		0 Gat hvort stöð upp 1 né sest 1 Gat annað hvort sest eða stöð upp 2 Gat bæði stöð upp og sest		
18.	Sundlingastökkt inn í fjöruð (Lækrímboati 3 þús. æfingur)		0 Engin heppnið tilraun 1 heppnið tilraun 2 2 heppnið tilraunir		

[illegible]

X



EXHIBIT 10-1