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# The Effect of 12 Weeks of Ski Training on Some Biometric Features of Girls

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**Abstract**

The aim of this study was to investigate the effect of skiing on the biomotoric characteristics of children with evaluating tests of girls between the ages of eight and 14 before and after the season. The experimental group of this study was 15 girls who had just started skiing and the control group of 30 girls. In total, 45 volunteers joined the study. To follow the development of the children in the study, the Bruininks biomotoric-Oseretsky proficiency testing of engines, Second Edition Short Form (BOT 2 brief) test: Fine Motor Precision, Fine Motor Integration, Manual Dexterity, Bilateral Coordination, Balance, Running Speed and Agility, Upper-Limb Coordination, and Strength was used and total scores were measured. All measurements observed changes in the first test by applying the latest testing methods. The Windows SPSS 17.0 statistical package program was used to analyze the data with Independent-Sample t-test to find the differences between the groups. Statistically meaningful levels resulted as $p< 0.05$ and $p< 0.001$. No meaningful differences were found in the comparison of the motoric features of the girls who ski and those who do not in their pre-test. A meaningful difference was found in fine motor skills, fine motor accord and total score after ski training. Ski training contributed to the fine motor skills, fine motor accord and total score of the girls.

**Keywords**: skiing, girls, motoric features

## 1. Introduction

It is easier to create enthusiasm for sport at an early age so that foundations are laid for a generation doing sport leading to a healthier society (Taş & Sinanoğlu, 2017).

All societies wish for the healthy growth and development of new generations. The ability of children to grow and develop in a healthy manner is related to genetic qualities as well as the quality of their living conditions. Environmental factors such as the geographical conditions of the child's country, the socio-economic and cultural characteristics of the family, traditions and customs of the community, and the living conditions of the family where the child is a member can influence the speed and level of its growth and development (Mülazımoğlu, 2006).

Motor development is the motivation of the organism in response to the physical growth and development of the central nervous system (Özsaydı et al. 2015).

The development advances as a whole in physical, mental, emotional and social areas. The development of the child in an area is associated with the development in others. For example, physical development is mostly associated with the child's movement development. The normal development of the muscular system facilitates movement development, which is also associated with social development. If a child can move comfortably he can easily interact with people and this facilitates social development; so social interaction accelerates mental development (Yüksek et al. 2015).

Irregular nutrition, games played on a computer instead of traditional games, limited play areas and the overprotective attitudes of parents can negatively affect the motor development of children. In order to be able to raise children following healthy and normal developmental stages, the level of motor development of the child must be known, and environments must be created that allow the child to present and act on physical activities that can support all developmental areas (Gallahue & Ozmun, 2006, Mülazımoğlu & Gürsoy, 2012).

Physical health acquired during childhood and youth and maintained for life is considered essential for the body to function at its highest capacity (Baltacı, 2008). Research on the development of sportive performance is mostly focused on long-term structured training planning and achieving the highest performance targets for athletes using different methods (Yıldız et al. 2013).

When taken into consideration, balance skills and motoric characteristics that are really important in skiing vary with environment, sex and heritage - conducting the same studies in various regions of Turkey that show many geographical differences and comparing results of the performance of skiing subjects can contribute to skiing sports performance. Particularly in the cold regions of Turkey, researching the contributions of recreational skiing to children being healthier and stronger raises the importance of this study.

Based on this information, the aim of this study is to investigate the effect of alpine skiing on the biomotoric characteristics of girls between the ages of eight and 14 before and after the season.

## 2. Method

### *2.1 Experiment Group*

The experiment group of this study was 15 girls who began skiing in the program of the Erzurum Youth Services and Province Sport Head Office and the control group of 30 girls studying at Saltuk Bey Secondary School. In total, 45 volunteers between the ages of eight and 14 participated in the study. To evaluate the anthropometric characteristics of the experimental and control groups, before the experiment the age, height, weight and body mass index measurements of both groups were taken. Height was measured at tolerances of 1 mm using a Fisco steel tape measure while keeping bare feet flat on the ground, the heels together and knees straight while bodies were in the upright position. Body weight was taken at 100 gram tolerances while wearing a t-shirt and light sweatpants. Body mass index was taken by dividing body weight by the square of the height.

### *2.2 Training Program, Applied Tests and Measurements*

To assess the anthropometric characteristics of the research and control groups, age, height, weight and body mass index (BMI) measurements were taken in both groups before the test. BOT-2 (Bruininks-Oseretsky Motor Proficiency Test 2) short form test was used to measure the biomotoric properties of the research and control groups. BOT 2 was measured in short form: Fine Motor Precision, Fine Motor Integration, Manual Dexterity, Bilateral Co-ordination, Balance, Running Speed and Agility, Upper-limb Co-ordination and Strength tests were applied and the total point score (Raw score) was measured.

Table 1. 12-Week Ski Training Program for Girls

| Week | Ski Training |
|---|---|
| **Week 1.** | Learn how to use the equipment properly (buckle the ski boots, get into the ski binding) |
| | Warm up exercises or games |
| **Week 2,** | Stand on the skis and hold the balance |
| | Get a feeling for the movement of the skis on snow |
| | Climbing techniques |
| **Week 3.** | Learn to parallel climb and ski a few meters |
| | Learn to fall correctly |
| | Straight skiing |
| **Week 4.** | Snow plow and braking |
| | Ski control with snow plow (ski straight and use snow plow to slow down) |
| **Week 5.** | Ski control by shifting the weight left and right |
| | Start to do basic turns with snow plow |
| **Week 6.** | Learn easy turns with snow plow |
| | Learn to control turns thru obstacles |
| | An overview |
| **Week 7.** | Learn to use ski-poles |
| | Learn to ski in groups by following one another |
| **Week 8.** | Learn to control speed and distance from other skiers |
| **Week 9.** | Learn to control the poles while turning and shifting weight, doing snow plows and skiing thru obstacles |
| **Week 10.** | Learn to use the chair-lift properly |
| **Week 11.** | Practice plows, braking, turning, and controlling speed and distance on the blue slope |
| **Week 12.** | Learn to parallel ski while turning and braking |

### *2.3 Statistical Analysis*

Normality distribution tests were applied to determine whether normality distribution was appropriate for the data and parametric tests were used to analyze the data, assuming that normal distribution of data was appropriate. Paired Samples t-test was performed in the pre- and post-test comparison of Bruininks-Oseretsky Motor Proficiency Test-2.

One-way ANOVA test for analyzing differences according to birth dates and Paired Samples t-test was performed to compare the control group with the skier girls. Statistical significance levels were taken as $p < 0.05$ and $p < 0.001$.

## 3. Results

The comparative findings of the study are given below.

Table 2. Some demographic characteristics of skiing girls and non-athletic girls

| | **Skier (N=15)** | | | | **Non-Athletic (N=30)** | | | |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **Average ± SS** | | | | **Average ± SS** | | | |
| **Height (Cm)** | 145.47 ±16.37 | | | | 144.90 ±7.88 | | | |
| **Weight (Kg)** | 39.67 ±13.28 | | | | 34.97 ±5.48 | | | |
| | ***Right*** | | ***Left*** | | ***Right*** | | ***Left*** | |
| **Dominant Hand** | 14 | | 1 | | 28 | | 2 | |
| **Dominant Foot** | 9 | | 6 | | 27 | | 3 | |
| **BMI** | **Normal** | | **Overweight** | | **Normal** | | **Overweight** | |
| | 9 | | 6 | | 24 | | 6 | |
| **Birth Terms** | **1. Term** | **2. Term** | **3. Term** | **4. Term** | **1. Term** | **2. Term** | **3. Term** | **4. Term** |
| | 3 | 4 | 4 | 4 | 7 | 6 | 11 | 6 |

The demographic characteristics of the girls participating in the survey are given in Table 2.

Table 3. Evaluation of skiing girls after three months of skiing education

| **Bruininks-Oseretsky Motor Proficiency Tests (BOT2)** | | **Paired Differences** | | **t** | **p** |
|---|---|---|---|---|---|
| | | **Avg.** | **Std. Dev** | | |
| **Fine Motor Precision** | **1. Test** | .000 | .378 | .000 | 1.000 |
| | **2. Test** | -1.733 | .799 | -8.404 | ** |
| **Fine Motor Integration** | **3. Test** | -.533 | .743 | -2.779 | * |
| | **4. Test** | -.467 | .915 | -1.974 | .068 |
| **Running Speed and Agility** | **9. Test** | -.333 | .900 | -1.435 | .173 |
| **Upper-limb Coordination** | **10. Test** | .267 | 1.280 | .807 | .433 |
| | **11. Test** | .200 | .775 | 1.000 | .334 |
| **Strength** | **12. Test** | -.133 | .915 | -.564 | .582 |
| **Total Points** | | -2.733 | 2.492 | -4.248 | ** |

Significant differences were found in the study. The first test was followed by three months of ski training, followed by the second test of Fine Motor Precision ($P < 0.001$), the third test of Fine Motor Integration ($P < 0.005$) and total points $P < 0.001$.

Table 4. Comparison of the pre-test of skiing girls with the motoric characteristics of non-athletic girls

| **Bruininks-Oseretsky Motor Proficiency Tests (BOT2)** | | **Avg.** | **Std. Dev** | **t** | **p** |
|---|---|---|---|---|---|
| **Fine Motor Precision** | **1. Test** | .719 | .033 | .363 | .719 |
| | **2. Test** | .071 | -.567 | -1.848 | .071 |
| **Fine Motor Integration** | **3. Test** | .705 | .067 | .381 | .705 |
| | **4. Test** | .205 | -.200 | -1.286 | .205 |
| **Balance** | **8. Test** | .486 | .033 | .703 | .486 |
| **Running Speed and Agility** | **9. Test** | .276 | .533 | 1.104 | .276 |
| **Upper-limb Coordination** | **10. Test** | .087 | .633 | 1.750 | .087 |
| | **11. Test** | .140 | .300 | 1.504 | .140 |
| **Strength** | **12. Test** | .472 | -.233 | -.726 | .472 |
| **Total Points** | | .480 | .700 | .712 | .480 |

There was no significant difference in the comparison of pre-test motoric characteristics of the girls in the study.

Table 5. Comparison of the post-test of skiing girls with the motoric characteristics of non-athletic girls

| Bruininks-Oseretsky Motor Proficiency Tests (BOT2) | | Skier (n=15) Mean ±SS | Non-athletic (n=30) Mean ±SS | t | p |
|---|---|---|---|---|---|
| **Fine Motor Precision** | **1. Test** | 2.93±258 | 2.90±0.31 | .363 | .719 |
| | **2. Test** | 3.7±1.34 | 2.50±1.04 | 3.209* | |
| **Fine Motor Integration** | **3. Test** | 4.1±46 | 3.47±0.57 | 3.533** | |
| | **4. Test** | 2.9±80 | 2.67±0.48 | 1.400 | .169 |
| **Running Speed and Agility** | **9. Test** | 8.40±1.35 | 7.5±1.76 | 1.675 | .101 |
| **Upper-limb Coordination** | **10. Test** | 4.40±99 | 4.0±1.3 | .946 | .349 |
| | **11. Test** | 7.0±00 | 6.90±55 | .703 | .486 |
| **Strength** | **12. Test** | 7.40±1.40 | 7.50±1.11 | -.261 | .795 |
| **Total Points** | | 60.80±3.08 | 57.37±3.45 | 3.259* | |

In the study, it was found that there were significant differences between the 3-month skiing girls and the non-athletic girls in terms of the second test of Fine Motor Precision ($P < 0.05$), in terms of the third test of Fine Motor Integration ($p < 0.001$) and in the total score ($P < 0.05$).

## 4. Discussion

Today, children are growing up in an unhealthy environment caught between technology, computer games and a fast food-style diet. This has become an important reason for children to participate in sports activities as physical education courses and lessons are not being actively pursued.

The purpose of this study was to compare some of the biomotoric properties of girls aged eight to 14 who were skiers and those not doing sports. Development of motor skills involves the growth of the body with the central nervous system in the same direction as the development of the mobility of the organism (Bayhan & Artan, 2004).

That children discover and handle their environment and gain their freedom through play have essential roles in social adaptation and making them participate in social activities. Gaining their freedom plays an essential role in sociological adaptation and pursuing activities (Haywood & Getchell, 2005).

There were no differences between the baseline values of the groups. There was no significant difference in the motoric characteristic comparison between the pre-tests of girls who skied and those who did not exercise (Table 4).

In the studies on skiers, it has been detected that female skiers have 20 to 22 percent body fat rates (Brown & Wilkinson, 1983). It was observed that the average body fat rate of the female students in elementary schools was 20,17 ±3,52 while the average body fat rate of national female athletes was 19,52 ±4,74 (Can & Polat, 2004). The studies on the American national skiing team showed that the body fat rate for the female athletes was 20.6 percent (Haymes & Dickinson, 1980).

The main reason for this is that children are in the age of development. While it is observed that the functional and bodily movements of girls and boys are similar until the period of rapid growth, it is stated that this alters during the rapid growth period. This finding is in parallel with our findings. The height and weight values of the girls participating in the study and the values of children of the same age in other studies are similar (Ağaoğlu, 2008).

When we look at the results of the pre- and post-tests of girls who had three months of skiing education, significant differences were found according to the Fine Motor Precision second test ($P < 0.001$), Fine Motor Integration according to the third test ($P < 0.05$) and total score ($P < 0.001$), (Table 5). Girls were trained for a total of 12 weeks, three days a week, and this program is shown in Table 1. As a result, significant differences in fine motor and fine motor alignment were determined. It can be said that the balance, speed-agility, coordination of the upper extremity and changes in the force do not affect the level of significance, but a major contribution is made to the total points.

In the article entitled "Child and Training", Acikada (2004) found that motor development occurs in the age range of 8-12 years for girls and that the working group is overlapping with the age range. We found similar results to those mentioned in the article.

The 12-14 age group in the development period did not reveal any differences in characteristics such as body weight, flexibility and balance in the students who did no active sports and active sports students who only participated in weekly Physical Education lessons. However, there was a significant difference in the parameters of right and left paw force, standing jump, shuttle, hanging with twisted arms and 10x5 m shuttle running in comparison between these two groups (Kızılakşam, 2006).

8-10 years is in the last childhood period. In terms of psychomotor development, sports related movements are located in this period. In this phase, physical change allows the child to better understand and use the body. Therefore, the child registers great development in the skills required for compliance and control (Koç 2006). As seen in our study, there is a significant difference in fine motor alignment.

In his study to examine how the movement education 'which is given to children who have pre-school education and are aged five to six' has impacts on anthropometric and motoric developments of children, he revealed that his planned movement education that is applied for a long time influenced some anthropomorphic characteristics of children in a positive way and improved their motoric performances positively as well. Although these studies show differences between age groups, they emphasize the importance of environmental factors in terms of 'development' like the movement education and its opportunities (Ersoz, 2012).

In another related study, teachers used observation forms so that they could evaluate whether the motoric performances of children who are first, second and fourth year students were high or low. As a result of this study, it was detected that there is a significant difference in the BOMYT score ($p<.05$) of the children who were classified as high motoric performance and low motoric performance by their teachers (Mülazımoğlu, 2012).

No statistically significant difference was found between the speed performances of participating children in this study. For this reason, in addition to sports studies, we think that differences in this age group are caused by the fact that the running speed of children is in the developmental stage. It has been noted by researchers that there is some difficulty in starting to train early in life (Muratlı, 2007).

In early ages, training to enhance speed ability has some drawbacks. Getting ready psychologically, the training of athletic techniques that should start with speed education and the importance of its precondition known as "coordinating training", relating the speed training to other developmental abilities and the tiredness that originates from the speed workout, and the necessity of taking other developers into consideration are all problematic. The speed shows different progressional features according to various age groups (Muratlı, 2007).

As a result, girls who were skiing between the ages of eight and 14 had positive developments in fine motor skills and fine motor adaptation. Skiing can be recommended for the development of motoric features in the 8-14 age range.

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