



# Education Quarterly Reviews

**Asan, Selim, Altuğ, Tolga, and Çingöz, Yunus Emre. (2021), An Investigation of the Effect of 12-Week Gymnastics and Ballet Training on Balance and Flexibility Skills in Preschool Children. In: *Education Quarterly Reviews*, Vol.4 Special Issue 1: Primary and Secondary Education, 207-213.**

ISSN 2621-5799

DOI: 10.31014/aior.1993.04.02.240

The online version of this article can be found at:

<https://www.asianinstituteofresearch.org/>

Published by:

The Asian Institute of Research

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# An Investigation of the Effect of 12-Week Gymnastics and Ballet Training on Balance and Flexibility Skills in Preschool Children

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## Abstract

The aim of this study is to examine the impact of a 12-week gymnastics and ballet training on the balance and flexibility skills in pre-school children. The study was conducted with a total of 23 girls who had just started gymnastics (n = 11) and ballet (n = 12) in private sports clubs in Erzurum, Turkey. The verbal provocation method was used during the tests and exercises since the children aged 5-6 years may have low attention span. Also, some alternative methods (i.e. educational games) were used in cases where children were distracted. Flexibility of the children was measured on the sit-and-reach box, and their static balance was measured with the flamingo balance test. First, the pre-tests and then, after 12 weeks of training, the post-tests were administered, upon which the difference between the pre-test and post-test scores was estimated. Mann-Whitney U Test was used to examine the relationship between pre-test and post-test values. No statistical significance ( $p > 0.05$ ) was found between the balance pre-test and post-test scores after 12 weeks of training, while a statistical significance ( $p < 0.05$ ) was found in terms of the flexibility scores. As a result, it turned out that the training did not affect the stabilization between the two branches, but it increased the flexibility development in gymnasts in comparison to ballerinas. This can be explained by the different development rates of balance and flexibility in children, and also by the fact that gymnastics and ballet develop children's bio-motor characteristics at different rates.

**Keywords:** Ballet, Gymnastics, Static Balance, Flexibility, Pre-school

## 1. Introduction

In the modern era, interest in sports is increasing day by day and being engaged in a sport is growing in importance among people. Taking up sports in childhood is essential to establish a healthy relationship between an individual and the society, help children to become self-confident and kind-hearted individuals, get rid of harmful habits, and thereby building a healthy society. In this regard, attention has long been turned to children's

sports activities in developed countries since sport helps children not only from a physical development standpoint, but also in terms of their development as a whole. Children engaged in sports have healthy physical and mental characteristics as well as social skills such as mutual aid, respect for rules, and sense of responsibility (Mengütay, 1998). One of the aims of education and training is to develop teaching behaviors (Çağlayan Tunç & Günay 2020). Daily life habits, physical activity level, age emotional reactions do not directly affect behaviors (Çağlayan Tunç, 2021). Aerobic strength tasks, physical and physiological characteristics are factors that affect success (Uca 2019). This results in better sports performance (Alizadeh Ebadi & Çetin 2018). Improving mental wellbeing and socialization, and leading a quality life are closely related to physical activities (Daley, 2002). In developed societies, the attention paid to the mental wellbeing of children is also paid to their physical wellbeing, and relevant methods that help develop these two domains are used in education. Numerous research studies have been conducted to encourage children to take up at least one branch of sports as far as their interests are concerned. (Çelik & Şahin, 2013). The pre-school period is the fastest period of the growth and progress in children. During this period, children begin to develop permanent behavioural changes in their lives depending on the quality of the education they receive (Bulut, 2019; Şahin, 200).

According to Gallahue (1982), motor development in children consists of three phases: rudimentary movements, fundamental movements, and sports-related movements. Children's motor development is regarded as skills such as reflexes, postural movements, walking, running, and jumping. In addition to these skills, movements such as running, jumping and rolling in gymnastics improve flexibility. Also, flexion and extension movements are the fundamental exercises that directly influence the psychomotor development of children.

It is crucial that children learn how to use and control their bodies to support their cognitive and social development (Mülazımoğlu, 2006). Since the essence of gymnastics is multi-muscle movements and harmony, it requires basic motor skills such as coordination, attention, balance and flexibility. Also, gymnastics adds functionality to the motor skills. It allows muscles and joints to function, and develops physical and mental capacity at the same time (Bencke et al., 2002).

As an academic dance technique, the rules are clear in ballet, and when combined with other artistic elements, it turns into a stage performance. Ballet also stands out among the visual arts as it is fun to watch and is influential, as well as triggering children's imagination. Yet, it requires discipline and sacrifice. In ballet education, balance, coordination, attention, and flexibility are of the greatest importance. The reason for this is that these skills are the fundamental movement elements of ballet (Ayvazoğlu, 2015). In other words, ballet is a dance that promotes children's healthy development by supporting their muscle development, proper bone development, and physical flexibility. An early age to start dancing is important, both because it is a suitable period for shaping the body structure and organization in order to perform ballet art correctly, and because it will allow the child to develop a flexible, coordinated and balanced body with the help of ballet. These processes support each other bilaterally (Ayvazoğlu, 2015).

It is necessary to choose suitable branches of sport for the optimum development of children. In this respect, gymnastics is very important in terms of extension and stretching exercises. Ballet training is defined as a branch of sports that affects the development of balance and joint mobility. (Kabakcı, et al., 2017). Flexibility is an important criterion for the healthy development of children and of mobility. (Ünusan, 2003). Maintaining the balance and improving the balance ability can ensure that the learned movement will be sustainable with the same high quality. The ability to move in a straight line, maintain a technical position, or a steady posture over a period of time is the basis of physical activities, which play an important role in all stages of children's lives starting from childhood.

Children with athletic ability can control their bodies after being able to coordinate them, as well as maintaining balance and attention, and moving their bodies in harmony. This sense of control increases children's self-confidence. Children should, therefore, be encouraged to participate in sports and physical activities at appropriate ages in order to form the basis of a healthy life at an early stage (Orhan, 2019). The contribution of physical activities to individuals should not be limited to the development of sports (Karaküçük, 2009).

Research based on scientific data in contemporary sports education is expected to bring permanent success in the short term. In this respect, conducting research is critical in order to set the goals in sports, achieve them, and make the necessary plans. The relevant literature shows that there are very few publications on the roles of gymnastics and ballet that help pre-school children improve their motor characteristics (Kesmiş, 2016). From this point of view, this study has aimed to examine the effects of a 12-week ballet and gymnastics training on the flexibility and balance skills of pre-school children.

## **2. Materials and Methods**

### *2.1. Sample Group and Model*

The present study included a total of 23 girls, who were receiving gymnastics and ballet trainings in private sports clubs in Erzurum, Turkey, and participated in this study voluntarily with the permission of their families. Eleven of the girls had just started gymnastics, and 12 of them had just started ballet. The study was conducted in line with the pre-test and post-test method, and the verbal provocation method, which particularly aimed to maintain the children's attention during the tests and exercises since the attention levels of children aged 5-6 are often low. Alternative methods (educational games, etc.) were also used in cases where children seemed distracted. The tests and exercises were carried out by people with pedagogical training and field knowledge. The pre-test phase included height and body weight measurements as well as flexibility and flamingo static balance tests. The difference between the pre-test and post-test scores was examined after the post-test values were obtained after the 12 weeks of training, twice a week for 40 minutes per day.

### *2.2. Data Collection Tools*

#### *2.3. Measurement of Height*

Measurements were made with an accuracy of 0.01 cm when the participants were bare feet, standing on an electronic scale.

#### *2.4. Measurement of Body Weight*

The participants were weighed in kilograms with an accuracy of 0.01 kg when the participants were bare feet and wearing tights and a T-shirt, standing on an electronic scale.

#### *2.5. Measurement of Flexibility*

A sit-and-reach box was used to measure the children's flexibility. In the sitting position on the floor, the soles of the feet were placed to the sit-and-reach box with the legs fully extended. Without bending the legs, hands were extended forward towards the box with both hands on top of each other, and the score was recorded in cm after waiting for 2 seconds at the last point. The better score was recorded upon two repetitions.

#### *2.6. Flamingo Balance Test*

The flamingo balance test was conducted to measure the static balance of the participants, who tried to stay balanced for 1 minute on a wooden balance beam of 50 cm length, 4 cm height, and 3 cm width. The time was stopped when they lost their balance (in case of putting a foot down, falling off the board, touching the ground with any part of the body). When the participant got on the balance beam and kept her balance again, the time continued from where it left off. The test was carried out in that way for a minute, at the end of which the sample group's number of attempts to stay stable (after falling) was counted and recorded as their score (Deforche, et al., 2003).

### 2.7. Statistical Data Analysis

The data were entered into the SPSS 20.0 software, and the Mann Whitney U Test was used to examine the relationship between pre-test and post-test scores of the athletes in gymnastics and ballet.

### 2.8. Ethical Text

Ethics committee approval for the present study was obtained from Sports Sciences Ethics Committee of Atatürk University. Having being explained the content and purpose of the study, the families were asked to sign the informed consent form of Sports Sciences Ethics Committee of Atatürk University.

## 3. Results

Tests	Branch	N	$\bar{X}$	Mean Rank	Rank Sum	U	P
<b>Height pre-test</b>	Gymnastics	11	112.8182	13.91	153.00	45.000	.194
	Ballet	12	110.3333	10.25	123.00		
<b>Height post-test</b>	Gymnastics	11	116.0909	13.59	149.50	48.000	.80
	Ballet	12	114.0000	10.54	126.50		
<b>Body weight pre-test</b>	Gymnastics	11	20.8182	14.05	154.50	43.500	.164
	Ballet	12	18.7500	10.13	121.50		
<b>Body weight post-test</b>	Gymnastics	11	23.0909	13.64	150.00	48.000	.264
	Ballet	12	21.5000	10.50	126.00		
<b>Flexibility pre-test</b>	Gymnastics	11	31.1818	13.09	144.00	54.000	.455
	Ballet	12	29.9167	11.00	132.00		
<b>Flexibility post-test</b>	Gymnastics	11	34.8182	15.14	166.50	31.500	<b>.033*</b>
	Ballet	12	31.2500	9.13	109.50		
<b>Balance pre-test</b>	Gymnastics	11	19.2727	12.23	134.50	63.000	.877
	Ballet	12	19.0833	11.79	141.50		
<b>Balance post-test</b>	Gymnastics	11	14.5455	11.05	121.50	55.500	.513
	Ballet	12	16.1667	12.88	154.50		

\*  $p < 0.05$

The table shows that according to the branch variables of the participants, no statistically significant ( $p > 0.05$ ) differences were observed in height pre-tests ( $u = 45.000$ ;  $p = .194$ ) and post-tests ( $u = 48.000$ ;  $p = .280$ ), body weight pre-tests ( $u = 43.500$ ;  $p = .164$ ) and post-tests ( $u = 48.000$ ;  $p = .264$ ), flexibility pre-tests ( $u = 54.000$ ;  $p = .455$ ), and balance pre-tests ( $u = 63.000$ ;  $p = .877$ ) and post-tests ( $u = 55.500$ ;  $p = .513$ ), whereas statistically significant differences were detected in the flexibility post-tests ( $u = 31.500$ ;  $p = .033$ ).

As a result of the comparison, a statistically significant difference ( $p = .033$ ) was found between the athletes who do gymnastics and who do ballet in their post-tests of flexibility, in which gymnastics athletes ( $\bar{X} = 34.8182$ ) were observed to have higher scores of flexibility than those of ballet athletes ( $\bar{X} = 31.2500$ ).

#### 4. Discussion

Our study examined the effect of a 12-week gymnastics and ballet training on the development of balance and flexibility in pre-school children, and there are other studies in the literature showing similarities in terms of height and body weight of the participants (Webster-Gandy et al., 2003; Kayapınar, 2007; Özbar, 2007; Kayapınar. and Özbar 2004).

According to the branch variable, no statistically significant differences were found in balance pre-tests ( $U = 63.000$ ;  $p = .877$ ) and post-tests ( $U = 55.500$ ;  $p = .513$ ) ( $p > 0.05$ ). In the literature, there are studies examining the impact of the branch variable on balance, as well as those comparing the experimental and control groups in similar branches. Tüfekçioğlu and Ayça (2008) compared the pre-test results of the experimental group and the control group in their study on children aged 4-6 years, yet could not detect a significant difference amongst the static balance, dynamic balance, and quickness measurements. In a study by Anamurluoğlu (2020), the results of the post-test balance parameters of the experimental and control groups were reported to show no significant difference between the groups ( $p > 0.05$ ). Likewise, Karaman (2019) found no significant difference between the experimental group's pre-test and post-test scores.

On the other hand, some studies comparing the experimental and control groups reported significant differences in favour of the former group. Tekin (2009) stated that the trainings in the experimental group contributed more to the balance parameters. Arınlı (2019) examined the effect of strength and balance trainings on the performance of ballerinas aged 11 to 15 years, and observed that there was a significant increase in strength parameters and time to stay in balance as a result of participants' additional training. Özbar (2007) pointed out a significant difference in favour of the experimental group ( $p < 0.01$ ) in static and dynamic balance scores. In the post-test results of the study conducted by Yarımkaya and Ulucan (2015), a significant difference was found in the balance parameter of the experimental group. Şen (2004) found that the static balance results of the experimental group were higher than those of the control group ( $p < 0.05$ ). According to Çelebi (2010), a significant difference ( $p < 0.05$ ) was observed in favour of the experimental group in both the boys' and girls' groups in the single-leg balance post-tests. Tüfekçioğlu (2002) reported that there are significant changes in the static balance of children at the end of the perceptual-motor development program for children aged 4-6. In another study conducted with kindergarten children, Altınök (2006) found that special physical education programs applied to children between the ages of 5-6 result in significant differences in the static balance of children. Mülazımoğlu (2006) concluded that gymnastics training programs have a significant impact on children's balance skills. Similarly, İnan (1989) found that children with gymnastics training demonstrate higher scores of single-leg balance skills than children who only attend kindergarten.

In our study, no significant difference was found in the flexibility pre-tests according to the branch variable ( $U = 54.000$ ;  $p = .455$ ). In some other studies in which experimental and control groups were compared with respect to flexibility, no significant difference was found, either. Similarly, Karaman (2019) found no significant differences between the pre-test and post-test values of the experimental group as a result of the comparison of the experimental and control groups. Anamurluoğlu (2020) reported no significant difference between the experimental and control groups ( $p > 0, 05$ ) when the flexibility post-test results of both groups were examined.

As a result of the comparison in our study, a statistical significance ( $p = .033$ ) was found between gymnastics and ballet athletes according to the flexibility post-test values. In the post-tests, the gymnastics ( $\bar{X} = 34.8182$ ) athletes were found to have higher flexibility scores than those of the ballet ( $\bar{X} = 31.2500$ ) athletes. Given that the children in our study have just started in either branch, the outcome can be assumed to be related to the implementation of flexibility exercises in the gymnastics branch in a relatively more technical and comprehensive way than how they are applied in the ballet branch.

In the relevant literature, we have come across a number of studies in which experimental and control groups in the same discipline are compared and significant differences are detected in favour of the experimental group. For instance, Anamurluoğlu (2020) reported that the capacity of dynamic balance, standing long jump, quickness

and flexibility of children in the 3-5 age group developed at the end of a 6-week basic classical ballet training and educational game program. Various studies on flexibility have reported a statistically significant difference in favour of experimental groups (Altinkök 2006; Özbar 2007). A study by Zülkadirlioğlu (1995), focusing on the effects of a 12-week gymnastics and swimming program on flexibility and conditional features in girls and boys aged 5-6 years, concluded that the programs resulted in significant differences in the development of flexibility. Karaman (2019) reported that significant differences emerged between the pre-test and post-test values of the control groups. Moreover, Saygın et al. (2005) stated that movement training is effective on children's sit and reach scores.

## 5. Conclusion

As a result of the comparison between the flexibility and balance parameters of gymnastics and ballet athletes who were subjected to 12 weeks of exercise, no statistical significance was detected between the pre-test and post-test results of height, body weight, and balance scores as to the branch variable. While there were no significant differences between the pre-test scores of flexibility, a significant difference was observed in the relevant post-test scores.

## 6. Recommendations

- ✓ Similar studies may contribute to the literature when conducted in different branches by including different age groups.
- ✓ Conducting studies using experimental and control groups in the same branch may contribute to the development of the literature.
- ✓ Further studies to examine the specific impacts of different branches of sport on children's bio-motor skills will enrich the literature and function as a guide for exercise planning.
- ✓ Micro and macro managing the youth and children for these kinds of activities and preparing them for the better future is everyone's task.

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