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Annals of Biological Research, 2012, 3 (9):4409-4413
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The Effects of Task Difficulty and Instruction on Focus of Attention in Performing Balance Task

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ABSTRACT

The investigations show that the focus of attention plays an important role in performing different motor skills. The purpose of this investigation was to study the effects of task difficulty and instruction on focus of attention in performing balance task in junior high school students. A total of 60 boys and 60 girls were randomly placed in two easy and difficult task groups (30 subjects each). An equal number of each group (10 subjects each) was randomly assigned in two experimental (external and internal attention) and one control groups. The subjects in easy and difficult groups performed balance tasks in a 6 attempts for 15-second. A digital balance meter and an air cushion were used to measure easy and difficult balance skills respectively. The results ANOVA showed that girl students didn't show significant differences at $p < 0.05$ when performing the easy and difficult balance tasks receiving instruction on external and internal focus of attentions. Also, there wasn't a significant difference between girls in external and internal experimental groups performing difficulty balance task when receiving instruction on focus of attention. The results of ANOVA, however, were different when boys compared with the girls. The boys showed significant different balance skill in easy and difficult tasks. No significant difference was found between the boy subjects receiving external and internal focus of attention instructions. Therefore, it is to suggest that physical education teachers should pay attention to these psychological factors in teaching simple and difficult motor tasks to their students.

Key words: Balance, Task Difficulty, Attention, Internal, External

INTRODUCTION

Attention is one of the most significant constraints affecting learning and the performance of skills, hence focusing of attention is a method of increasing the efficiency and learning [1]. Therefore, the type of focusing of attention should be determined so that more benefit can be obtained from it. Also, a superior focus of attention can be applied for training new motion skills in clinics for educating disabled children and it is difficult for them to learn new sports skills [2].

Researchers have evaluated the issue of attention in sport activities such as golf, tennis, volleyball and its impact on learning and performance. The role of attention in learning sport skills has dramatically been considered by researchers such as Wulf, et al. (2002), Landers (2005) and Freedman, et al. (2007) in recent years [3, 4, 5] . Researchers and occupational therapists use different methods to attract one's attention in various ages. One of these methods is verbal instructions to shift the focus of attention to key and critical aspects of movements [6].

Schmidt and Lee (2011) assert that the focus of attention is the act of shifting senses to information resources or objects by an individual [1]. Focusing the attention points to the point that how and where an individual focuses his

attention in a performance situation and Haywood and Getchell (2009) recognized the focusing of attention as a state of attention in which irrelevant stimulus become ineffective and relevant ones are reinforced [8].

Individual focus of attention has a significant effect on learning and the performance of motor skills. It has, for example, been shown that presenting instructions in the way that shifts the individual's attention to the effect of movement instead of body movement, leads to an increase in the accuracy of golf hits [9, 10], tennis court [11], football hit [12] and basketball free throw [13]. However, there exist other studies considering the external focus of attention in improving balance and controlling stature more effective [14].

Many research results indicate that the focus of attention has an important role in the performance and learning physical and motion skills such as balance. In recent studies, the benefits of learning have been mentioned while the focus of attention shifts to the effect of movement compared with the state in which only the movement is paid attention to. The importance of this issue has been proved in learning many movement activities including maintaining balance in the performance of the skills of skiing, cycling, basketball, volleyball, and golf [15]. Studies conducted on balance-maintaining activities show that the type of focus of attention not only affects learning motion skills, but also its immediate effects which in turn can put influence the learner's performance is considered important. Wulf (2007) for example, refers to Wulf et al. (2004) to show that the focus of attention can have immediate effects on the individual motion performance [15, 16]. They conducted a study in which the subjects had to maintain their balance on an inflated rubber disk in three stages taken only 15 seconds. They also compared the effects of both internal- and external focus of attention in maintaining the balance. The obtained results indicated that considering the external focus of attention for making balance has less fluctuation compared with using the internal focus of attention [15].

Today, scientific research has specifically investigated the effects of the focus of attention on the level of learner's performance and learning compared with the difficulty level of the activities. It has probably been thought that the benefits of focus of attention are especially raised for complex skills requiring relatively high controlling ability [15].

Thus, recent studies have tried to regularly evaluate the conditions of conducting activities by manipulating the focus of attention along with an effective factor. Exterminating the conditions being responsive to the effects of focus of attention is important for scientific reasons since teachers, educators and medical professionals properly use the benefits of the focus of attention in training motor skills or during rehabilitation. This issue is especially important in a recent finding expressing that the level of performance and learning principles can be improved through a certain degree of difficulty that cannot be generalized to other level of difficulty. In fact, there are many reasons to prove this issue that the instructions of the focus of attention are useful only when the activity has an appropriate level of difficulty [15].

Although the difficulty of task has an effective role in performing the movement, many researchers have conducted their studies without controlling the difficulty of the task. In studies investigating the effects of the level of difficulty of a given task and type of focus of attention, the importance of task difficulty and type of focus of attention have clearly been shown. Researchers have concluded that the effect of focus of attention can be different due to the level of difficulty and difficulty of the activity.

Among these researches, it can be pointed to the study by Wulf, et al. (2007) in which the researchers tested the subjects in two conditions. In the first test, they used a solid surface and in the second one, they used a flexible surface under the participants' feet. In the second test i.e. when harder activities was used, the amount of postural twists and lack of balance became significantly more, but the benefits of external focus of attention were more compared with the internal focus of attention and controlling conditions [15].

The results obtained from two tests by Wulf, et al (2004) is also an indicator of clear differences in the effectiveness of the type of attention as a function of the level of difficulty. In this research, in the first test, an adult and healthy young group having no difference resulting from the effects of focus of attention was used. In contrast, the second test was done on the patients suffering from Parkinson (individuals having the history of stumbling and falling) that the movements were somewhat challenging and competitive for them. The effects of the type of focus revealed that the external focus of attention lead to the reduction of balance disorders in patients with Parkinson.

These results indicated that the experimental movements studied in the first test have not been challenging and competitive enough for this group so that they can provide observable examples of the benefits of the focus of attention. This confirms the theory that a certain degree of instability and difficulty may be a prerequisite for the occurrence of the effects of the focus of attention (16, 15).

With an emphasis on the views of researchers that the difficulty of the task and the focus of attention play a role in skill performance, due to the lack of knowledge on the focus of attention and its dimensions by physical education teachers and coaches and their influence on the optimal implementation of the skills, the necessity of conducting this research is felt. The purpose of this study is to investigate the task difficulty and the instruction of the focus of attention on performing balancing task in third grade students of secondary level. It is hoped that this research could assist the physical education teachers and coaches in implementing their educational goals.

MATERIALS AND METHODS

This study is an experimental – field design in which the task of performing balance skill was done for girl and boy junior high school students which randomly divided into two task groups (easy and difficult). Also, the difficulty of their task in two experimental groups (internal and external focus of attention) was studied with a control group in a $6 \times 2 \times 2$ table.

The study population consisted of 1771 junior high school girl students and 1314 boy students. Among the population, 60 girls and 60 boys were randomly selected. Then, 60 girls were randomly placed in two groups of 30 subjects for easy and difficult task. A similar sampling was conducted for 60 boy subjects. At the end, every 30 girls and 30 boy students were randomly replaced in two experimental groups with instructions of the external and internal attention, and a control group with the number of 10 individuals.

The subjects in both easy and difficult groups conducted performing the balance task with 6 attempts for 15 seconds. Subjects in both experimental groups of external and internal focus of attention and a control group performed the balance test. All subjects conducted 6 attempts for 15 seconds that they had 20 seconds rest between any attempts. Easy task was conducted through standing subjects on a balance screen and putting feet on rectangular paper pieces in dimensions of 30×17 cm (each under a foot) stuck on the balance screen. The task of the subjects was trained as to maintain the balance state on the balance screen with the kind of attention (internal attention: attention to the screen under feet - external attention: attention to feet pressure equally divided between feet). The level of task difficulty was created through manipulating the balance surface (hard surface against wavy surface). In the easy form, subjects stood on the smooth and hard surface of balance and in the difficult form, on air cushion placed on balance screen.

To measure the balance, the digital balance system or measuring the body status sustainability system made in satrap metal was used which evaluates the body status sustainability with recording the involuntary moment fluctuations being invisible with eyes. The system performance in foreign research [16], [17] and internal research [14], [13] has been reported successful. A person standing on balance screen that measures the vertical forces resulting from the body weight in various parts is performed. Balance system includes both software and hardware parts.

The hardware part includes a body or frame with dimensions of $15 \times 50 \times 50$ cm. Body or frame has been considered to allocate the sensors that the balance screen is placed on them. The software part of the system is related to the changes of the center of pressure. Also, a stopwatch was used to measure the rest time between each subject attempt, a height gauge and weight scale were used to measure the subjects' height and weight.

In addition to the balance system, an inflatable cushion was used to measure the easy and hard task. The inflatable cushion is to increase the task difficulty and make height unstable. This issue has been done based on the previous studies and tests that had the various conditions of difficulty like standing on a hard surface against standing on a sponge foam [15], putting a rubber screen rounded by wind on the balance screen [16], standing on one foot on a piece of wood against standing on two feet [18]. The rational argument in the use of air cushion was that this act provides new and more challenging equilibrium conditions for participants and meanwhile it was selected according to the experimental sample done to test these conditions.

In this study, fluctuation index per centimeter has been used as the balance score and in both easy and difficult task, this score has been considered equivalent to the balance. The ANOVA and MANOVA were used to test the intended hypothesis and p value was set at < 0.05 .

RESULTS

The analyzing results of factor variation indicated that girl subjects have any significant differences in the implementation of balance skill neither in task difficulty (hard, easy) nor in the instruction of focus of attention (external, internal). F values were reported as 1.90 and 2.52, respectively that both were not significant in the level

of $p < 0.05$. Furthermore, a significant interaction was not observed between the task difficulty and instruction of internal and external focus of attention in implementing the balance of girl students.

Table 2: the results of factor analysis (2 * 3), the variable of the static balance implementation based on the task difficulty (easy and difficult) and the focus of attention instruction (internal, external and control) of girl students.

Source of Variations	SS	DF	MS	F	P
Task difficulty (easy & hard)	5.02	1	5.02	1.90	0.173
Focus instructions (internal , external and control)	13.31	2	6.65	2.52	0.090
Task difficulty ,focus of instruction	5.93	2	2.96	1.12	0.332
Error	142.42	54	2.63	-	-

Analyzing the factor variance about boy subjects showed different results compared to that of girls. Students showed a different balance skill in the easy and difficult task groups; however, in the focus of internal and external attention instruction, no significant differences were observed between their performances. F values were 6.79 and 2.51, respectively that at $p < 0.05$, the first one was significant but the latter was not significant. In other words, according to the mean of both groups, male students with an easy task had an improved status compared with the students with a difficult task in implementing balance. Given the significant interaction between task difficulty and focus of attention instruction, there is a significant relationship between task difficulty (easy and hard) and the focus of attention instruction (internal, external and control) of boy students in terms of balance implementation.

Table 3: the results of factor analysis (2*3), the variable of the static balance implementation based on the task difficulty (easy and hard) and the focus of attention instruction (internal, external and control) of boy students

Source of Variations	SS	DF	MS	F	P
Task difficulty (easy & hard)	21.28	1	21.28	6.79	0.012
Focus instructions (internal , external and control)	15.76	2	7.88	2.51	0.090
Task difficulty, focus of attention instructions	33.87	2	16.93	5.40	0.007
Error	169.19	54	3.13	-	-

Table 4-6: the results of post hoc (LSD) to compare the mean scores of implementing static balance based on task difficulty (easy and hard) and the focus of attention instruction (internal, external and control) of boy students

Groups		Mean	1	2	3	4	5	6
1	Easy task with an internal focus group	2.99	*	-	p=0.035	P=0.007	P=0.005	P=0.049
2	Easy task with an external focus group	3.55		*	-	-	-	-
3	Easy task with the control group	4.25			*	-	-	-
4	Difficult task with an internal focus group	4.61				*	-	-
5	Difficult task with an external focus group	4.68					*	-
6	Difficult task with the control group	4.16						*

DISCUSSION AND CONCLUSION

Based on the results of the current research allocating on the study of the effect of task difficulty and focus of internal - external and control attention instruction in implementing static balance, the obtained results indicate this issue that for students, task difficulty and focus of internal- external attention instruction have no effect on implementing static balance. These results are consistent with the research results of Vickie et al (2010), Uehara, et al. (2008), Landers et al (2005) and the first experiment of Wulf, et al. study (2004) [19, 20, 4, 16] and inconsistent with the research results of Emanuel, et al (2007) and the second experiment Wulf, et al. study (2004) [6, 16].

The researchers in their studies concluded that the effects of the focus of attention occur only when the activities are relatively challenging to the subjects. This conclusion is based on the compulsory theory. According to "the compulsory theory", the focus of attention on the effects from a movement (external) compared with the movement itself (internal) improve the process of using the involuntary or automatic control and allow body motor system to naturally and more guide and organize itself [21]. Therefore, when performing a motor activity is difficult for a person, shifting the individual focus of attention to the effects of body movements (external focus of attention) can encourage him in using the motor program that he have learned during exercises along with other similar activities and makes it easy to do. However, if the performance of the activity is relatively simple and it is able to be done in the automatic and involuntary control mode, it can't be expected a performance in using the external focus of attention. This issue confirms this theory that a certain degree of instability may be required for the effects of the external focus of attention to occur as a precondition [15].

Among the samples that Wulf points to for confirming this theory is the study by Landers, et al. (2005) in which the postural balance of patients suffering from Parkinson disease is measured under various conditions [4]. In this study, significant advantages and benefits of external focus only on those who had a history of falling were observed. However, these effects did not considerably occur in people who had such a history. The study results show that the functional advantages and benefits of external focus of attention are dependent on the rate of activity challenges which have an effect on young and adult people. These findings confirm that the relative degree of an activity, namely, hardness (as a function of one's capabilities) may act as a critical and sensitive factor for the occurrence of the effects of the focus of attention [15].

Wulf believes that the type of the focus of attention affects on the degree in which voluntary and reactive control mechanisms reach balance state and cause postural balance in this state. In fact, the labor theory suggests that that an external focus of attention is essentially effective and useful in proportion to the challenging activity [15]. Therefore, based on the above-mentioned results, it seems that in this study, the type of task for the third-grade high school students having perfect health was not challenging enough so that involuntary control processes could be applied and the type of focus of attention be effective.

Suggestion:

Some of coaches know the factors of fitness as the only criterion to select players but it can be considered psychological factors in addition to fitness through recognizing the attention so that it can make the chance of sports victory and success twice. If educators can identify these psychological factors, strengthen them and give them direction, they will achieve further success and progress. As the results of this study showed, recognizing the focus of attention and its internal and external dimensions can be very effective in successful learning of the skills and it is necessary that physical education teachers and coaches develop their awareness on the importance and their awareness of the focus of attention.

REFERENCES

- [1] R. Schmidt, T. Lee. **2011**. Human Kinetics, NY
- [2] J. Hartman, T. Hunfalvay, *Journal of motor behavior*, **2002**, 2: 95-123.
- [3] G. Wulf, N. Mc Connel, M. Gartner, A. Schwarz, (2002). *Motor behavior*, **2002**, 34(2): 82-177
- [4] M. Landers, G. Wulf, H. Wallmann, M. Guadagnoli, *Physiotherapy*, **2005**, 91:152-185.
- [5] S. E. Freedman, E. Maas, M. P. Caligiuri, G. Wulf, D. A. *Journal of Speech, Language, and Hearing Research*.**2007**, 50: 131-13.
- [6] M. Emanuel, T. Jarus, O. Bart . *Journal of the American Physical Therapy Association*, **2007**, 88(2):251-260.
- [7] K. Haywood, N. Getchell, 2009, 5th edition, Human Kinetics. NY.
- [8] R. Duke, C. D. Cash, S. E. Allen. *Journal Research in Music Education*, **2011**, 20: 1-12.
- [9] N. Perkins-Ceccato, S. R. Passmore, T. D. Lea, *Journal of sports sciences*. **2003**, 21: 593-600.
- [10] G. Wulf, B. Lauterbach, T. Toole , *Research Quarterly for Exercise and Sport*, **1999**, 70:120-126.
- [11] G. Wulf, N. H. Mc Nevin, T. Fucgs, F. Ritter, T. Toole. *Research quarterly Exercise and Sport*, **2000**, 71: 229-239.
- [12] G. Wulf, S. Wachter, S. Wortmann , *Women in Sport and Physical Journal*, **2003**, 12: 37-52.
- [13] E. Zareian, M.A. Thesis,**2003**, Tehran University, Iran.
- [14] A. Moghaddam, M. K. Mousavi, M. Namazi Zadeh, *Motion magazine*, **2008**, 36: 23- 37.
- [15] G. Wulf, T. Thomner, and C. H. Shea, *Motor control and learning*, **2007**, 78: 257-264.
- [16] G. Wulf, M. Landers, J. Mercer, T. Tollner, Annual meeting of North American Society.**2004**.
- [17] N. H. Mc Nevin, C. H. Shea, G. Wulf, **2003**, *Psychology Research*, 67(1): 9-22.
- [18] N. Vuillerme, V. Nougir, *Brain Research Bulletin*, **2004**, 63:161-165.
- [19] G. D. Vicke, C. C. Clearwater, *Journal of Coaching Education*.**2012**, 3(1):1-13
- [20] L. A. Uehara, C. Batton, K. Davids, *Brazilian Journal of Biomotricity*, **2008**, 2(1): 63-77.
- [21] R. Abdollahipour, A. Bahram, M. Shafizadeh, H. Khalaji. *Journal of movement sciences & sport*, **2008**, 1: 83-92.