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Improving Students' Balance Skill by Circuit Game Model on Push Bike Extracurricular in Kindergarten School

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Abstract Early-age children require particular care for their physical motor development as they are in their golden age. One of the aspects of physical motor development is balance skills which can be improved using a push bike. Push bike has gained excellent popularity for accelerating children's balance skills. In contrast, a complex and less directed circuit game may hinder children's balance skills acceleration. Therefore, the purpose of this study is to develop a circuit game model to improve children's balance on push bike extracurricular. This study used a development method referring to the Plomp, Kemp, Hannafin, and Peck, as well as Borg and Gall development model, with a quantitative approach. 12-20 students from Laboratory Kindergarten of Universitas Negeri Malang, Indonesia, participated in this study. For the validity test, we conducted content validity on the developed game and its implementation. As a result, we successfully developed a circuit game model to enhance the balance skill of students who attended the push bike extracurricular. This circuit game model consists of 10 circuit games that can be completed by walk, run, and jump as instructed. Our data suggested that these circuit games bear positive influences and efficiency on students' balance skills. Thus, this circuit game model can serve as a reference for enhancing students' balance skills on push bikes extracurricular. We suggest these circuit games can be the warming up section before the children start the push bike activities, also they can be adopted for schools that have push bike extracurricular as the warming up section.

Keywords Balance, Circuit Game Model, Kindergarten Students, Push Bike

1. Introduction

Children at early age experience unique growth and development phase, which forms a singular pattern of children's growth level [1]. Law of National Education System No 20 the Year 2003, article 28 paragraph 1, defines that the early age children are between 0-6 years old. This period is frequently referred to as the golden age since it is the best time for stimulating an individual's growth. During this period, children present rapid development, as a previous study reported 40% of human development occurs at this age [2]. Fadlillah & Khorida [1] also described the golden age as the finest moment for

children to develop their potential. Meanwhile, in monitoring the children's development, parents are guided by the general milestone of children's development, such as the standard content concerning the achievement of 0-6-year-old children's development introduced in appendix I of Regulation of Indonesia Ministry of Education and Culture No 137 the Year 2014 on the national standard of early childhood education.

That regulation describes the attainment of children's development at specific ages in a gradual manner. The essential scope of development required to be examined in early-age children involves the values of religion, values of morality, as well as physical-motor, health, safety behavior, cognitive, language, social-emotional, and art progression. These elements of development can be observed since newborns. Among those aspects, physical-motor development is divided into gross and fine motor skills. The gross motor includes activities involving the capacity of big muscles, such as walking, running, jumping, and so forth. Meanwhile, fine motor activities invlove the skills of smaller muscles, such as writing, drawing, pointing out, and holding [3]. Additionally, for children, motion becomes the gate of knowledge and stimulus, which later enhance their potential. Children who are provided with broad opportunities to move and train their physical body encounter accelerated neural maturation, resulting in a more optimum preparation for their next learning phase since early childhood facilitates more expeditious physical motor development [4].

Balance is one of the crucial elements of physical motor development that need to be investigated. Balance skills can be defined as someone's capacity to regulate the center of their body mass on a weighted point. It serves as a part of gross motor skills that aid children in developing their further motion requiring balance. Additionally, balance skills are also perceived as the skill to maintain body condition in numerous positions. The inability to optimally master these skills may disrupt children's daily functions. For example, they can easily fall, get injured, have issues maintaining their stability while moving, as well as difficulties in maintaining the body posture when sitting, standing, running, and other motions [5].

At an early age, children tend to have high mobility and high movement frequency. They mostly love simple movements, such as jumping, hopping, throwing, running, and kicking. With that great mobility and movement, children's balance can be stimulated through balance exercises which are commonly presented in the form of physical exercises and games [5]. Examples of games for balance exercise include walking on a footbridge, walking on one leg, jumping rope, dancing, and riding a push bike. Push bikes or balance bikes have gained increasing popularity among parents as a medium for enhancing children's balance. A push bike is a two-wheel bicycle that has no driving system, such as pedals and chains. Casman [6] described a push bike as a simulation tool in the form of a bike without pedals, requiring the users to swing their legs on the floor.

Push bike capacity to improve children's balance has been reported in a number of studies. It enhances children's stability and balance since they have to regulate and control it independently. Casman [6] discovered that push bikes could effectively increase children's balance, object control, and self-esteem. By using push bikes, children feel secure and confident since they control the push bike by themselves. Besides, by swinging their legs on the ground, they experience better balance and easier control. Also, push bike aids children's independent learning [7].

With its application, schools who have push bike extracurricular need to pay more attention to children’s abilities while using push bike. Some children maybe do not have a good balance skill so we need to enhance their balance skills by giving them a warming up section before the extracurricular starts. Warming up can strengthen and stretch joints and muscles, allowing them to exercise with a greater range of motion. Warming up can be formed into a circuit game. Push bike was the extracurricular in Laboratory Kindergarten of Universitas Negeri Malang, Indonesia, where the children need to be trained to improve their balance skills while using the push bike. Thus, this study focuses on constructing a more directed and complex circuit model to increase balance skills in early-age children in Laboratory Kindergarten of Universitas Negeri Malang on push bike extracurricular.

2. Materials and Methods

This study used a development method referring to the Plomp [8], Kemp [9], Hannafin, and Peck [10], as well as Borg and Gall [11] development model, with a quantitative approach. There were 12-20 in “A” group class with ages ranging 4-5 years. Students, boys and girls, from Laboratory Kindergarten of Universitas Negeri Malang participated in this study. Each participant consented this study, the Headmaster of Laboratory Kindergarten of Universitas Negeri Malang, the teachers, and the parents also consented and were willingly to participate in this study. For the validity test in this study, we carried out a validity test on product development and implementation. The data were further analyzed using a t-test with one group pretest and posttest design [12]. In this study, we did not use push bike on the field tryout and experiment test. The push bike was used in pre-test and post-test. In the implementation of field tryout and experiment test, the students completed the circuit by walking, running, and jumping without push bike. As a note, push bike was an extracurricular in Laboratory Kindergarten of Universitas Negeri Malang, each child who attended the push bike extracurriluar brought their own push bike with the same specification of the bike. Therefore, the children who involved in this study have known how to ride the push bike. This study focused on the development of circuit game model to enhance the balance skill of students who attend

the push bike extracurricular.

The procedures of product development consisted of 1) need analysis, 2) identification of aspiration regulation model desired, 3) initial product (hypothetical) development, 4) experts test, 5) small-scale tryout (product tryout), and 6) field try out (implementation of the model), as summarized in table 1.

3. Results

a. Development of Circuit Game Model

The circuit game model being developed in this study is illustrated in Figure 1.

Description:

1. Circuit 1: walking in a zig-zag through 10 cones, with a 75 cm distance between each cone
2. Circuit 2: running in a zig-zag while passing through 10 cones, with a 75 cm distance between each cone
3. Circuit 3: facing upfront, jumping from cone 1 to the other following cones in order, by landing on both legs with the hands holding a cone
4. Circuit 4: jumping with both legs following the motion pattern (jumping nine times)
5. Circuit 5: running, then jumping pass through nine obstacles, with a 75 cm distance between the obstacle and landing on both legs
6. Circuit 6: walking on a rope or footboard with an 8-meter length (dynamic balance),
7. Circuit 7: jumping from cone to cone sideways while throwing and catching beanbag with both hands
8. Circuit 8: moving two legs on the first circle, then jumping from one circle to other circles, and completing a quarter of a round in each jump
9. Circuit 9: playing using both legs and hands, adjusting to the picture by jumping and walking
10. Circuit 10: standing supported by one leg while another leg is bent backward, forming a plane (static balance).

Table 1. Development procedures of circuit game model

No	Stages	Information	Source of information (subject)	Analysis Technique	Product
1	**Stage I (Preliminary Research)**				
a.	Need analysis	Understanding the model of the circuit game	teachers/parents from Laboratory Kindergarten	Descriptive	Data for identifying the issues on the circuit game model
2	**Stage II (Initial Draft of Learning Model)**				
a.	Development of push bike game model prototype	Identification of circuit game models prototype	Literature study, field study, teachers of Laboratory Kindergarten, Universitas Negeri Malang	Aiken Scale	Prototype of circuit game models
b.	Development of the product's assessment instrument	Produce a valid and reliable instrument to measure the developed circuit game models	Experts of the game. Experts in physical motor development	Aiken Scale	Instrument for product assessment
c.	Development of an instrument for measuring the effectiveness	Construct a valid and reliable instrument to measure the circuit game's efficiency	Literature study	Likert Scale	Instrument for effectiveness
3	**Stage III (Field tryout)**				
a.	Field tryout	Construct an effective circuit game	Revision of product, teachers, and experts of the game	Aiken Scale	Instruction for circuit game model
b.	Experiment test	Construct a model of an effective circuit game model bike	Circuit game model	Experiment research	Instruction for circuit game model
c.	**Results of development**				Circuit games to stimulate children's balance skills that had been tested

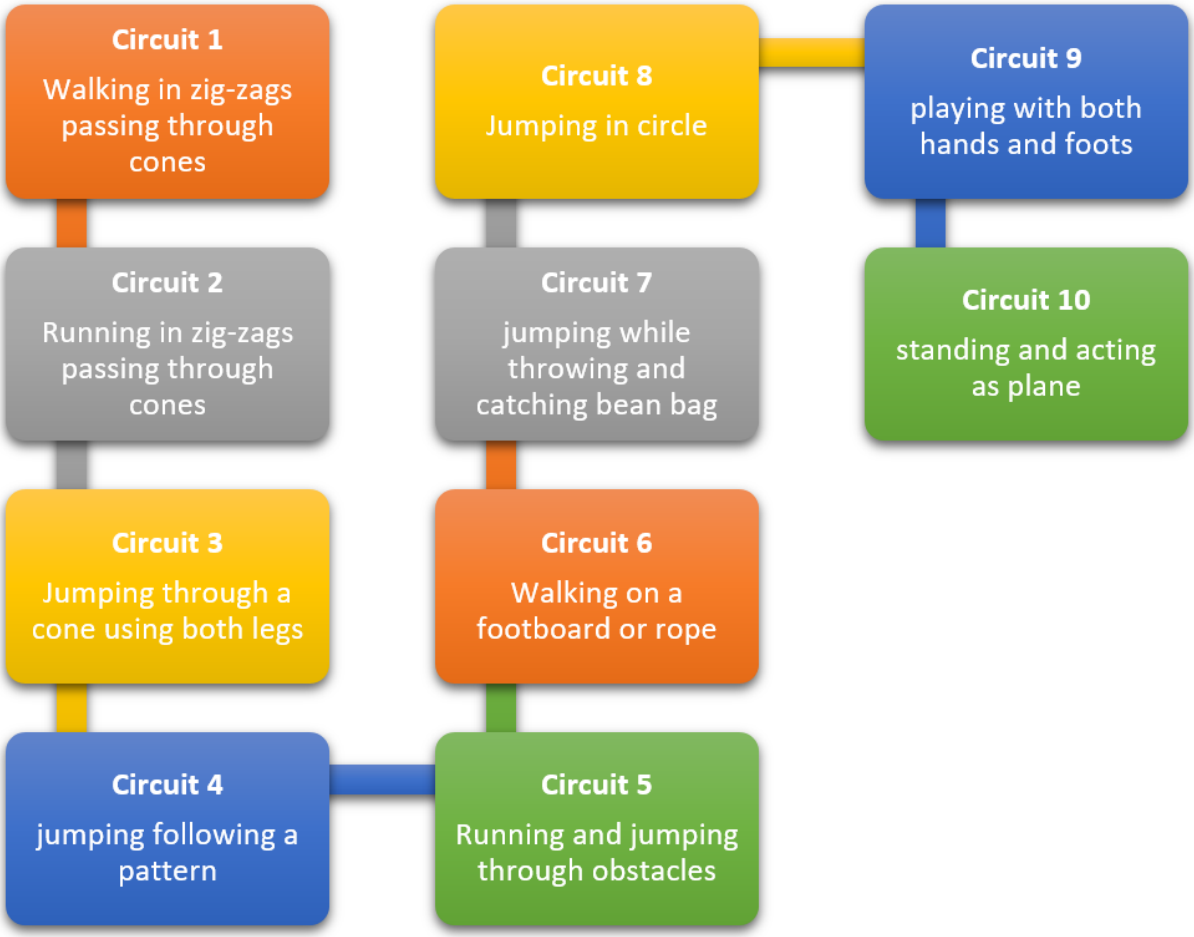

Figure 1. Illustration of Constructed Circuit Game

b. Results of Validity Test and Tryout

1) Developed Product

The content validity test was carried out by involving three validators, consisting of one expert in early education learning, one expert in motion activity for early-age children, and one expert in games. Our instrument consisted of five components, namely (1) the fundamental concept of the circuit game model to stimulate early age children's balance, (2) the principle of the circuit game model to stimulate early age children's balance, (3) the purposes of circuit game model to stimulate the early age children's balance, (4) characteristics of circuit game model to stimulate the early age children's balance, and (5) simple and comprehensible instruction of use for the circuit game model to stimulate the early age children's balance.

As presented in Table 2, the fundamental concept, principle, purpose, and characteristics of constructed circuit game model attained scores of 0.78, 0.89, 0.89, and 0.89 from the experts, respectively, and were categorized as moderate, highly valid, highly valid, and very valid. Meanwhile, for the instruction of use, our developed circuit game model attained a 0.78 score, categorized as moderate. These results illustrated that the constructed game has valid concepts, principles, purpose, characteristics, and instruction of use.

2) Implementation of Developed Product

The implementation stages of the circuit game model for stimulating the balance skills on push bike extracurricular are presented in Figure 2.

Table 2. Components of Product Validity Test Instrument

No	Instrument Components	Validator			Validity Score for Each Item	Category
		V1	V2	V3		
1	Does the circuit game model's fundamental concept stimulate early-age children's balance skills?	3	3	4	0.78	Moderate
2	Do the principles of circuit game mode stimulate early-age children's balance skills?	3	4	4	0.89	Very Valid
3	Does the purpose of the circuit game model stimulate early-age children's balance skills?	4	3	4	0.89	Very Valid
4	Does the circuit game characteristics stimulate early-age children's balance skills?	4	3	4	0.89	Very Valid
5	Does the instruction of use for circuit game model stimulate early-age children's balance skills and can be easily comprehended by teachers and students?	4	3	3	0.78	Moderate

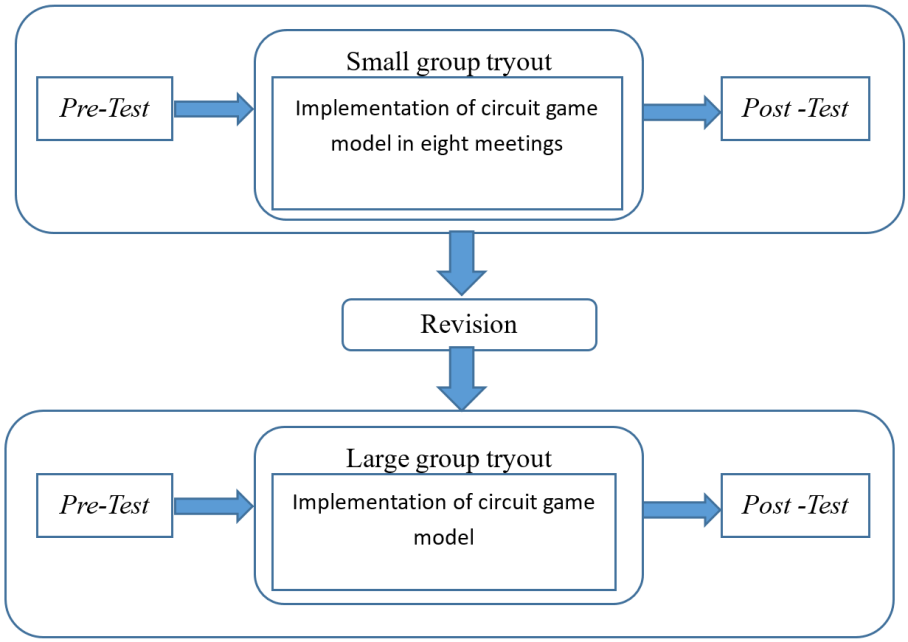

Figure 2. Implementation Stages of Circuit Game Model on the Small and Large Group

(a) Results of Small Group Test

- Game Implementation on Small Group

The developed game model was implemented in a kindergarten class consisting of 12 students and two teachers from Laboratory Kindergarten of Universitas Negeri Malang. During the implementation, we also involved four college students as members of our research team. The data were garnered through an observation sheet of small group game implementation, while the game was implemented in five meetings, starting from the initial, main, to closing activities. Each observation sheet item was scored 1-4, following the scoring guidelines.

The small group tryout results suggested the capacity of our formulated circuit game model to stimulate early-age children's balance skills on a push bike extracurricular. As presented in Table 3, from the implementation process, we obtained average scores of 84.20, 87.30, 87.45, 89.35, and 90.40% from the first to fifth meetings, respectively.

Table 3. Results of Game Implementation on Small Group

Meeting	Average Score %	Category
Meeting 1	84.20	Excellent
Meeting 2	87.30	Excellent
Meeting 3	87.45	Excellent
Meeting 4	89.35	Excellent
Meeting 5	90.40	Excellent

(b) Results of Large Group Test

- Game Implementation on Large Group

The large group tryout for our developed circuit game model was carried out in a kindergarten institution by involving 20 students, their parents, four teachers, and four college students. Data were gathered through an observation sheet in five meetings. The observation process started with the initial, main, and closing activities. Observers must assess each questionnaire item using 1-4 score ranges, as indicated by the indications.

Table 4. Results of Game Implementation on Large Group

Meeting	Average Score %	Category
Meeting 1	86.47	Excellent
Meeting 2	89.90	Excellent
Meeting 3	89.23	Excellent
Meeting 4	90.31	Excellent
Meeting 5	90.67	Excellent

Based on the test of the applicability of the game, the circuit game model was applied to stimulate balance skills on a push bike extracurricular in early childhood with 5 meetings. Meeting 1 with an average of 86.47%, meeting 2 averages 89.90%, meeting 3 averages 89.23%, meeting 4 averages 90.31%, and meeting 5 averages 90.67%.

c. Data Analysis

(1) Small Group

The obtained data were analyzed to identify the differences between the pretest and posttest, which indicated the effects of our developed circuit game model on a push bike extracurricular on early-age children's balance skills. The data analysis was completed using paired samples statistics, paired samples correlations, and paired samples tests through SPSS 24

• Test of Effectiveness

The effectiveness test from data gathered in a small group was analyzed using Paired Samples statistics, generating the average score, total sample, standard deviation, and mean standard error.

Table 5. Effectiveness of Circuit Game Model using Paired Sample Statistics

Paired Samples Statistics					
		Mean	*N*	*Std. Deviation*	*Std. Error Mean*
Pair 1	*Pretest*	338.3333	12	10.29857	2.97294
	Posttest	364.1667	12	14.43376	4.16667

The results of our statistical test using SPSS 24 showed the effectiveness of the circuit game model. The analysis results on the pretest data showed average score, standard deviation, and standard error mean of 338.33, 10.29857, and 2.973, respectively. Meanwhile, from the posttest data, we obtained an average score of 364.167, a standard deviation of 14.434, and a standard error mean of 4.1667.

• Correlation Test

The correlation test on pretest and posttest data was carried out using paired samples correlation. The obtained results from this test determined the results of our hypothesis testing. The hypothesis of this study was:

Ho: There is no correlation between the pretest and posttest scores from the implementation of the circuit game model in stimulating early-age children's balance skills on a push bike extracurricular

H1: There is a correlation between the pretest and posttest scores from the implementation of a circuit game model bike in stimulating early-age children's balance skills on a push bike extracurricular

Provision

If Sig > α, then Ho is accepted
If Sig < α, then Ho is rejected

Table 6. Results of Paired Samples Correlations

Paired Samples Correlations				
		N	*Correlation*	*Sig.*
Pair 1	*Preetest and Posttest*	12	.357	.000

As presented in Table 6, the result of paired sample correlation showed a correlation of 0.357 sig .000. Since the Sig 0.000 < α (0.05), Ho was rejected, signifying a correlation between the pretest and posttest. Therefore, the circuit game model attained a relatively high correlation score of 0.357, showing the circuit game model's ability to stimulate early-age students' balance skills on a push bike extracurricular.

• Difference Test

We used paired samples test to investigate the difference between the pretest and posttest scores. Further, the results of this test were used in determining the hypothesis testing. In this study, our hypothesis was:

Ho: There are no differences between the pretest and posttest scores from the implementation of the circuit game model in stimulating early-age children's balance skills on a push bike extracurricular

H1: There is a difference between the pretest and posttest scores from the implementation of the circuit game model in stimulating early-age children's balance skills on a push bike extracurricular

Provision:

If t count > t table, then Ho is rejected
If t count < t table, then Ho is accepted,
or
If Sig (2-tailed) > ½ α, then Ho is accepted
If Sig (2-tailed) < ½ α, then Ho is rejected

Table 7. Results of Difference Test on Pretest and Post-Test

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest - Posttest	-25.83333	14.43376	4.16667	-35.00410	-16.66256	-6.200	11	.000

Table 7 shows that the obtained Sig (2 tailed=0.00) < α=0.05, so that Ho was rejected, indicating significant difference between the pretest and posttest scores, after the implementation of circuit game model with push bike to stimulate the early age children's balance skills. Therefore, the effectiveness test results suggested the circuit game model's capacity to improve early-age children's balance skills.

(2) Large Group

The same series of tests were conducted on data attained from large group tryouts to identify the efficiency of the circuit game model in stimulating early-age children's balance skills with 20 students for the test. The data were analyzed using Paired Samples Statistics, Paired Samples Correlations, and Paired Samples Tests with the help of SPSS 24.

- Test of Effectiveness

The effectiveness test was carried out using paired sample statistics, with parameters of average scores, total samples, standard deviation, and standard error mean.

Table 8. Results of Effectiveness Test on Circuit Game Model

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	34.0000	20	1.16980	.26157
	Posttest	37.1000	20	1.02084	.22827

The results of paired sample statistic calculation using SPSS 24 are shown in Table 8. The results showed that from pretest data, we obtained mean, standard deviation, and standard error mean of 34, 1.169, and 0.2616, respectively. Meanwhile, from the posttest data, we obtained a mean of 37.00, a standard deviation of 1.1698 , and a standard error mean of 0.2283.

- Test of Correlation

The correlation test on pretest and posttest scores was carried out using paired samples correlations to determine the results of the hypothesis tests concerning the implementation of the circuit game model in stimulating early-age children's balance skills. Our hypothesis was:

Ho: There is no correlation between the pretest and posttest scores from the implementation of the circuit game model in stimulating early-age children's balance skills on a push bike extracurricular

H1: There is a correlation between the pretest and posttest scores from the implementation of a circuit game model in stimulating early-age children's balance skills on a push bike extracurricular

Provision

If Sig > α, then Ho is accepted
If Sig < α, then Ho is rejected

Table 9. Results of Paired Samples Correlations

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Pretest & Posttest	20	.309	.186

The results of paired samples correlation showed 0.309 sig .000, as presented in Table 9. The obtained Sig 0.000 < α (0.05)means that Ho was rejected. Thus, our data analysis suggested the presence of a correlation between the pretest and posttest scores in the implementation of the circuit game model, with a relatively significant correlation of 0.309.

- Test of Difference

In this study, we used paired sample test to investigate the difference between the pretest and posttest. Further, the results were used to determine the results of the hypothesis test on the circuit game model implemented in a large group. The hypothesis was:

Ho: There are no differences between the pretest and posttest scores from the implementation of the circuit game model in stimulating early-age children's balance skills on a push bike extracurricular

H1: There is a difference between the pretest and posttest scores from the implementation of the circuit game model in stimulating early-age children's balance skills on a push bike extracurricular

Provision:

If t count > t table, then Ho is rejected
If t count < t table, then Ho is accepted,
or
If Sig (2-tailed) > ½ α, then Ho is accepted
If Sig (2-tailed) < ½ α, then Ho is rejected

Table 10. Results of Difference Test on Pretest and Post-Test

Paired Samples Test									
		Paired Differences					*t*	*df*	*Sig. (2-tailed)*
		Mean	*Std. Deviation*	*Std. Error Mean*	*95% Confidence Interval of the Difference*				
					Lower	*Upper*			
Pair 1	*Preetest - Posttest*	-25.83333	14.43376	4.16667	-35.00410	-16.66256	-6.200	11	.000

As listed in Table 10, we obtained Sig (2 tailed=0.00) < α=0.05, showing that Ho was rejected. Thus, the data analysis results suggested significant differences between the pretest and posttest of circuit game implementation. In the end, the overall analysis results showed the effects of the circuit game model with push bikes on early-age children's balance skills.

4. Discussion

Balance is one of the essential aspects of physical-motor development that require careful observation. It is defined as someone's ability to control the center of body mass on a field or weight point. It is a part of gross motor skills. Accordingly, balance also aids children in completing their activities, which affects their development stages [13]. Balance skills also represent human's ability to maintain their body in various positions. In contrast, the children's inability to develop balance skills optimally may obstruct their daily functions. For example, they may fall and get injured easily, face issues in maintaining stability while walking, encounter problems in keeping the body postures when sitting down, standing, running, and walking, and face issues in completing other movements [5].

With its application, schools who have push bike extracurricular need to pay more attention to children's abilities while using push bike. Some children maybe do not have a good balance skill so we need to enhance their balance skills by giving them a warming up section before the extracurricular starts. Warming up can strengthen and stretch joints and muscles, allowing them to exercise with a greater range of motion [14]. Warming up can be formed into a circuit game. In its implementation, the push bike extracurricular requires a circuit that helps the children to enhance their balance skills before the extracurricular time starts. The circuit is a track used for a specific exercise [15], [16], with or without vehicles. Besides, it can also be used as a playing area for children to enhance their balance skills while on a push bike extracurricular. Thus, the circuit is an essential element to enhance while on a push bike extracurricular. Currently, we have numerous different models of the circuit, affected by the field area and domain, with most of the circuit winding. However, to date, we have not had a more complex circuit model. Thus, we need to construct a more directed and complex circuit model that enhances early-age children's balance skills.

Our developed circuit model contained a series of different circuit, namely (1) circuit 1: walking in zig-zag through 10 cones, with a 75 cm distance between each cone; (2) circuit 2: running in zig-zag while passing through 10 cones, with a 75 cm distance between each cone, (3) Circuit 3: facing upfront, jumping from cone 1 to other following cones in order, by landing on both legs with the hands holding cone; (4) circuit 4: jumping with both legs following the motion pattern (jumping for nine times); (5) circuit 5: running, then jumping and passing through nine obstacles, with 75 cm distance between the obstacle and landing on both legs; (6) circuit 6: walking on a rope or footboard with 8 meter length (dynamic balance); (7) circuit 7: jumping from cone to cone sideways, while throwing and catching beanbag with both hands; (8) circuit 8: moving two legs on the first circle, then jumping from one circle to other circles, and completing a quarter of round in each jump; (9) circuit 9: playing using both legs and hands, adjusting to the picture by jumping and walking; and (10) circuit 10: standing supported by one leg, while another leg bending backwards, forming a plane (static balance).

In addition, our statistical analysis results suggested that the circuit model carries positive and immediate effects on children's balance skills. Our variations of the circuit model enhance children's interest in completing the game. With greater passion, children's motivation to properly finish the game also increases. Schwalje, Moore, & Anderson [17] also reported a significant increase in motor skills in children with intellectual and developmental issues. Linearly, Becker & Jenny [18] also described a number of benefits offered by push bikes. For example, it can enhance children's balance skills, can be applied in school physical activities, can give fundamental knowledge of cycling, and can be a great initial physical activity.

Similar to other physical activities, children's use of push bikes requires supervision from the parents. Oishi [19] explained that push bikes might cause injuries on the face, head, hands, and feet if the children are not equipped with sufficient safety instruments. Besides, the push bike should also be checked regularly, such as its steering wheel or wheels [20]. Therefore, in using push bikes, children should be supervised by adults. Regular check is also required to ensure that every part of the push bike remains intact.

5. Conclusions

The development of circuit models on a push bike extracurricular presents positive and immediate effects in enhancing children's balance skills. The results of our validity test and tryout suggested that our developed circuit model has great quality. The statistical analysis results suggested that the circuit model carries positive and immediate effects on children's balance skills. Our variations of the circuit model enhance children's interest in completing the game. With greater passion, children's motivation to properly finish the game also increases. We suggest this circuit game can be the warming up section before the children start the push bike activities, also this circuit game can be adopted by schools that have push bike extracurricular as the warming up section. This study is still far from perfection, so we suggest that future researchers who are interested in this study can improve it to make it more useful for all people.

REFERENCES

[1] M. Fadlillah and L. M. Khorida, *Pendidikan Karakter Anak Usia Dini* [Early Childhood Character Education]. Yogyakarta: Ar-Ruzz Media, 2013.

[2] M. Khaironi, "Perkembangan anak usia dini [Early childhood development]," *Jurnal Golden Age*, vol. 2, no. 1, pp. 1–12, 2018, Accessed: Mar. 13, 2023. [Online]. Available: https://e- journal.hamzanwadi.ac.id/index.php/jga/article/download/739/590

[3] Sujarwo and C. P. Widi, "Kemampuan Motorik Kasar dan Halus Anak Usia 4-6 Tahun [Gross and Fine Motor Skills of 4-6 Year Old Children]," *Jurnal Pendidikan Jasmani Indonesia*, vol. 11, no. 2, 2015.

[4] W. C. Pratiwi and M. Munawar, "Peningkatan keseimbangan tubuh melalui berjalan di atas versa disc pada anak kelompok B PAUD Taman Belia Candi Semarang [Improving body balance through walking on versa discs in group B children of PAUD Taman Belia Candi Semarang]," *PAUDIA: Jurnal Penelitian dalam Bidang Pendidikan Anak Usia Dini*, vol. 3, no. 2, 2014.

[5] R. Fitri and M. L. Imansari, "Permainan Karpet Engkle: Aktivitas Motorik untuk Meningkatkan Keseimbangan Tubuh Anak Usia Dini [Engkle Carpet Game: A Motor Activity to Improve Early Childhood Body Balance]," *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, vol. 5, no. 2, pp. 1186–1198, Oct. 2020, doi: 10.31004/obsesi.v5i2.754.

[6] C. Casman, I. Pursitasari, A. Wijaya, and Y. Helfiyanti, "EFEK STIMULASI DINI MENGGUNAKAN BABY WALKER DAN BALANCE BIKE PADA PERKEMBANGAN MOTORIK ANAK [THE EFFECTS OF EARLY STIMULATION USING BABY WALKERS AND BALANCE BIKES ON CHILDREN'S MOTOR DEVELOPMENT OF CHILDREN]," *Jurnal Bahana Kesehatan Masyarakat (Bahana of Journal Public Health)*, vol. 5, no. 2, pp. 72–77, Nov. 2021, doi: 10.35910/jbkm.v5i2.526.

[7] C. Merc ê, M. Branco, D. Catela, F. Lopes, and R. Cordovil, "Learning to Cycle: From Training Wheels to Balance Bike," *Int J Environ Res Public Health*, vol. 19, no. 3, p. 1814, Feb. 2022, doi: 10.3390/ijerph19031814.

[8] T. Plomp, *Educational Design Research: an Introduction*. Netherlands: Netherlands Institute for Curriculum Development, 2007.

[9] J. E. Kemp, G. R. Morrison, and S. M. Ross, *Designing Effective Instruction*. New York: Macmillan College Publishing Company, 1994.

[10] M. J. Hannafin and K. L. Peck, *The Design Development and Education of Instructional Software*. New York: Mc. Millan Publ., Co, 1998.

[11] W. R. Borg and M. D. Gall, *Educational Research: An Introduction. Fifth Edition*. London: Longman, 1989.

[12] S. Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktik* [Research Procedure A Practical Approach]. Jakarta: Rineka Cipta, 2010.

[13] I. T. Hasanov and F. B. Mamataov, "Effectiveness of approaching a combination of theoretical and practical exercises in preparation for preschool children in physical training," *Miasto Przyszłości*, vol. 24, pp. 4–7, 2022.

[14] K. Mukhopadhyay, "Modern Scientific Innovations in Warming Up and Cool- Down in Sports," *Journal of Advances in Sports and Physical Education*, vol. 5, no. 7, pp. 166–175, Jul. 2022, doi: 10.36348/jaspe.2022.v05i07.007.

[15] E. Ramadhanty, R. T. Wulandari, and M. T. Tirtaningsih, "Abhinaya Circuit Video Media in Online Learning to Train Physical-Motor Ability of Early Childhood: A Developmental Studies," *Child Education Journal*, vol. 4, no. 1, pp. 38–49, May 2022, doi: 10.33086/cej.v4i1.2824.

[16] L. Dwiyanti, E. K. Wati, A. T. R. Sari, M. A. Zawawi, and S. A. Rahma, "Development of Smart Kiddo Games as an Effort to Improve Physical Motor and Language Abilities in Early Childhood," *Edunesia: Jurnal Ilmiah Pendidikan*, vol. 4, no. 1, pp. 282–293, Jan. 2023, doi: 10.51276/edu.v4i1.332.

[17] G. Schwalje, A. Moore, and E. Anderson, "Effect of Balance Bike Training on Balance in Children with Intellectual and Developmental Disabilities." Rutgers Biomedical and Health Science, 2020. Accessed: Mar. 13, 2023. [Online]. Available: https://www.sonj.org/wp-content/uploads/2020/02/Balance-Bike-Poster.pdf

[18] A. Becker and S. E. Jenny, "No Need for Training Wheels: Ideas for Including Balance Bikes in Elementary Physical Education," *J Phys Educ Recreat Dance*, vol. 88, no. 4, pp. 14–21, May 2017, doi: 10.1080/07303084.2016.1270789.

[19] T. Oishi, S. Amagasa, Y. Hayashi, and S. Uematsu, "Balance bike injuries: A retrospective chart review," *J Paediatr Child Health*, vol. 58, no. 7, pp. 1233–1237, Jul. 2022, doi: 10.1111/jpc.15965.

[20] K. C. DeGeorge, C. E. Neltner, and B. T. Neltner, "Prevention of unintentional childhood injury," *Am Fam Physician*, vol. 102, no. 7, pp. 411–417, 2020.