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Relationship Between Gross Motor Skill Proficiency and Health-Related Physical Fitness Among Children with Down Syndrome

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Objective It is objectified in this study to determine the relationship between the gross motor skill proficiency and the health-related physical fitness (HRPF) of musculoskeletal fitness, and body mass index (BMI) among children with Down syndrome (DS).
Methods Thirty-two children (16 boys and 16 girls) with DS aged 9 to 12 years old are identified in an institution of DS in Kuala Lumpur, Malaysia. A-priori calculation for sample size determination has been conducted from previous studies (Teng, 2012; Hasan, Abdullah and Suun, 2012) and G*Power software (version 3.1, Heinrich-Heine-Universität Düsseldorf, Germany). The sample size to be used in this study is 32 children with DS from the above institution.
In this sampling method, only the underweight and normal weight children with DS will be selected into the study according to the measurement tool of the body mass index-age-percentile and those who are psychologically and behaviorally fit to involve in the study will be the priority. Also, the children with DS whom afflicted with chronic disease (such congenital heart disease), physical disabilities (such as visual impairment, mobility impairment e.g pes planovalgus), and musculoskeletal injury are excluded from the study due its possible affect to the course of study.
A screening test will be conducted to identify the participant fit-study criteria into the conduction of the program. The screening tests and preliminary assessment include:
1. Physical Activity Readiness Questionnaire (PAR-Q) for children adopted from the Department of Physical Education and Sport Science's Research Ethic Unit, University of Limerick (University of Limerick, Department of Physical Education and Sport Science's Research Ethic Unit (n.d.).
2. Medical screening of registered health documentation of Early Intervention Program (EIP) by Malaysia Ministry of Health with the affiliated institution.
3. Body height and weight measurement for the evaluation of BMI.
The selected participants will undergo a familiarisation process of which they will be guided their study conduction test via the skill demonstration and the verbal description. The familiarisation guidance will follow according to the guidelines of a complete motor proficiency assessment particularly the relatable physical training (Ulrich, 2000).
The method of data collection is mechanical observation. The chosen participants of study will undergo the gross motor assessment of the Bruinink-Oseretsky Test of Motor Proficiency Short Form, 2nd Edition (BOT2 SF)(Bruininks, & Bruininks, 2005), and two HRPF tests of standing broad jump test (SBJ) (parameter of musculoskeletal), and BMI. The study instrument of BOT2 SF is assessing the gross motor composite of manual coordination, body coordination, and strength and agility.
In the assessment of motor proficiency of BOT2, the manual coordination composite assesses the control and coordination of the arms and hands, especially for object manipulation. It has 2 subtest of manual dexterity subtest and upper-limb coordination subtest. It. The body coordination composite assessing the control and coordination of the large musculature that aids in posture and balance. This motor composite consists of bilateral coordination subtest and balance subtest. The strength and agility composite measures the control and coordination of the large musculature involved in

locomotion. This motor composite has 2 subtests of strength subtest and running speed and agility subtest.

Gross Motor Skill Proficiency Assessment.

In the composite of body coordination, the participant is required to walk forward on a line and undergo the test of standing on one leg on the balance beam with eyes open for subtest balance. For the subtest of bilateral coordination of body coordination, the participant will need to jump in place of the same side synchronized and test of tapping feet and finger of same side synchronized. In manual coordination composite's subtest of upper-limb coordination, the participant will be undergoing the test of dropping and catching a ball with both hand and second test of ball's dribble with alternating hand. Whereas in the strength and agility's composite, the participant will do one-legged stationary hop, knee push-ups and sit-ups.

Standing Broad Jump

The participants are required to do a horizontal jumping. The task performance standing broad jump's horizontal distance is which, a jumping is successful when a person is able to jumps forward at least 5.08cm, both feet simultaneously (Palisano et al., 2000; Chow et al., 2014) and the longest horizontal distance will be recorded.

Body Mass Index

Participant's height will be measured in centimeter (cm) using portable stadiometer (Seca 206, Wall Mounted Tape Measure; Seca Corporation Weighing and Measuring System, Hamburg Germany). The participant will have to remove their shoes and stand up straight toward the measurement stadiometer. Reading of the height will be recorded to the nearest 0.1 cm. Weight is measured in kilogram (kg) using digital floor scale (Seca 803, Digital Flat Floor Scale; Seca Corporation Weighing and Measuring System, Hamburg Germany). After the measurement, BMI is calculated manually using the kg/m2 formula and then it is translated to BMI-age-percentile by gender based on the growth chart provided by World Health Organisation. Children with BMI < 5th percentile is classified as underweight, and >5th to <85th percentile as normal.

Hypothesis

I. There is no significant relationship between the gross motor skill proficiency (composites of manual coordination, body coordination, and strength and agility) and HRPF (musculoskeletal fitness and BMI) among children with DS

Results It is expected that the gross motor skill proficiency of children with DS is positively correlated with the SBJ test. However, the gross motor skill proficiency of the children with DS is anticipated that it will have a negative coorrelation with the measure of BMI. Descriptive statistics will be used to describe the central tendency, variability and frequency of the score. The Pearson correlation will be used to measure the relationship between the gross motor skill proficiency and HRPF's parameter among the children with DS.

Conclusions

Findings of this research will demonstrate the reciprocal significant the gross motor skill proficiency and HRPF among children with DS. By identified the importance parameters, more physical conditioning programs could be modeled for the children of DS such as muscular strength training, and an agility fitness training. It could be used as a a goal-directed training program to enhance the physical performance in any societal community of DS such as non-governmental organisation, or medical institution. This study could contributes to the development of motor learning and larger scope area toward adolescent group of DS.