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## Relation between gross motor skill development and socio-demographic factors among public and private primary school children in Myanmar

保健医療学専攻・理学療法学分野・応用理学療法学領域

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### Introduction

Human development can be divided into four main domains; cognitive, affective (socioemotional), motor, and physical domains. Motor development has profound effects on the development of other domains. Early assessment for the development of gross motor skills during preschool and elementary schools years is important to identify developmental problems of children. The quality Kindergarten (KG) program for 5-year-old children, which has been implemented in all public schools, private schools and other types of schools since 2016 June 01, is a new system in Myanmar which supports holistic development of a child including gross motor skills and KG is the base level or the first year (not Grade 1) of primary education. As there is currently limited information on gross motor skill development of 5-year-old KG children in Myanmar, it is necessary to investigate mastery level of gross motor skills. The test of gross motor development second edition (TGMD-2) is a reliable and valid assessment tool, originated in the United States, and which includes 12 gross motor skills (six locomotor and six object control skills). The locomotor skills are run, gallop, hop, leap, horizontal jump, and slide. The object control skills are striking a stationary ball, stationary dribble, catch, kick, overhand throw, and underhand roll. The skills of the TGMD-2 are similar to the majority of gross motor activities of new KG system. Although the new KG education system needs enough spaces in schools for gross motor skill activities, the situations of schools are still different between urban and rural areas, and also between public and private schools. The home environments are also different among individuals. Existing literature has stated that motor skill development of children can be influenced by biological and environmental factors. The main purpose of this study was to determine relation between gross motor skill development and socio-demographic factors among public and private primary school children in Myanmar.

### Methods and Results

#### Study 1: Reliability of the test of gross motor development second edition (TGMD-2) for Kindergarten children in Myanmar

The purpose of Study 1 was to investigate reliability of the TGMD-2. Fifty healthy KG children (23 boys, 27 girls) were participated. The assessment procedures were done according to the standardized guidelines of the TGMD-2 and the performance of every child was video recorded. Three raters separately watched the video recordings and rated for inter-rater reliability. The second assessment was done one month later with 25 out of 50 subjects for test-rest reliability. The video recordings of 12 subjects were randomly selected from the first 50 recordings for intra-rater reliability six weeks after the first assessment. The agreement on the locomotor and object control raw scores and the gross motor quotient (GMQ) were calculated. The reliability tests were calculated by using Cronbach's alpha, intra-class correlation coefficients, Pearson, and Spearman correlation coefficients in IBM SPSS statistic version 22.0 for Windows. The significant level was set as  $p < 0.05$ . The findings of all the reliability coefficients for the locomotor and object control raw scores and the GMQ were interpreted as good and excellent reliability.

#### Study 2: Gross Motor Skill Development of Kindergarten Children in Myanmar

The purposes of Study 2 were to examine the gross motor skill development of KG children in Myanmar, to compare the gross motor skill development of KG children between boys and girls and also between two geographical regions (urban and rural areas). Total 472 healthy KG children (237 boys, 235 girls) of 2016-2017 academic year from four schools in urban area and four schools in rural area of Myanmar were recruited. The assessment procedures were done according to the standardized guidelines of the TGMD-2. The descriptive statistics and one-way ANOVA with partial Eta squared and observed power were used to compare means. The majority of subjects had average level of gross motor skill rank. There were no significant differences on the locomotor skills between two genders. The boys outperformed the object control skills. The subjects from rural area had better locomotor skills while the subjects from urban area had better object control skills.

### **Study 3: Relation between gross motor skill development and biological factors as well as environmental factors in Kindergarten Children from three types of schools**

The purposes of Study 3 were to assess socio-demographic factors of all participants, to compare the gross motor skill development of KG children among three types of school settings, and to examine if there would be relationships between gross motor skill development and biological as well as environmental factors. Total 312 subjects from Study 2 after excluding the subjects who involved in the reliability study, who were older than 6-year-old and whose parents did not give written answers for socio-demographic factors were recruited in three groups. Group 1 consists of 131 (65 boys and 66 girls) subjects from three public schools in Yangon (urban area). Group 2 consists of 102 (58 boys and 44 girls) subjects from four public schools in rural area. Group 3 consists of 79 (45 boys and 34 girls) subjects from one private school in Yangon. A simple questionnaire including questions regarding biological factors (gender, height, and weight) and environmental factors (types of schools, houses, playgrounds, and occupational and educational status of parents) was used. The descriptive statistics and one-way ANOVA (Scheffe Post hoc test) were used to compare means among three groups. Multivariate multiple linear regression analysis was used to determine the influence of biological and environmental factors (10 independent variables) on the gross motor skill development (locomotor raw scores, locomotor standard scores, object control raw scores, object control standard scores, and the GMQ of TGMD-2) (5 dependent variables). The best performances of the locomotor skills were found in the subjects from the Group 2 and the object control skills were found in the Group 3. The gross motor skill development could be predicted by gender, and presence of playground or open space around the school or home environments but weight status, and other factors did not have statistically significant effect on the gross motor skill development.

#### **Ethical consideration**

This study was approved by the Ethics Review Committees (ERC) of International University of Health and Welfare, Japan (15-Io-115) and the University of Medical Technology, Yangon, Myanmar (3/2016) and endorsed by the ERC of the department of Medical Research, Ministry of Health and Sports, Myanmar.

#### **Discussion**

The findings of Study 1 were similar to previous studies in other countries except the test-retest reliability. The values of the test-retest reliability were lower than the previous studies because of time interval between the first and the second assessments. The previous studies used average 2 weeks interval while the current Study 1 used four weeks interval. This Study 1 recruited only 5-year-old children while the majority of the previous studies recruited children from 3- to 10-year-old for reliability studies. The findings of Study 2 showed that the gross motor skill development of KG children in Myanmar had a different tendency across gender and geographical regions which were concurred with the previous studies in other countries. Although the Study 2 had the strength of using large sample size, but it had some limitations for not recruiting subjects from different regions and ethnic groups across Myanmar. The findings of Study 3 highlighted that gender and physical environment of schools or home were strong predictors of the gross motor skill development of 5-year-old KG children. The limitations of Study 3 were that the groups could not be differentiated based on the socio-economic status, and the reliable and valid standardized questionnaire was not used for assessing home and school environments. Future studies are still needed to examine reliability of the TGMD-2 and assess gross motor skill development in children with different age groups, to find out other possible factors influencing the gross motor skill development, to determine the efficacy of exercise programs on gross motor skill development, and to assess other developmental skills in KG children.

#### **Conclusion**

In conclusion, the TGMD-2 can be used for assessing the gross motor skill development in Myanmar KG children. The findings will be able to provide the normative reference for the mastery level of the gross motor skills in 5-year-old children for future studies not only in Myanmar but also in other countries. The findings will be able to provide some consideration for the policy makers in the improvement of new KG education system and supporting facilities in the schools.

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