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Title of Doctoral Dissertation: Motor coordination development in children: Relation with behavioral attributes and quality of life

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The aim of this study is to explore the development of motor coordination and its relation to behavioral attributes and Quality of Life (QOL) in typically developing children. Fine motor coordination enables human beings to use tools and develop communication implements, artistic expressions, and science and technology. Development of motor coordination is related to brain maturation, and there are many studies regarding motor coordination development in children. Previous studies reported that the prevalence of developmental coordination disorder (DCD) in children was estimated to be 5-10 %. Children with DCD have low QOL and comorbid developmental disabilities such as attention and deficit/hyperactivity disorder (AD/HD) and autism spectrum disorder (ASD). Typically developing children whose motor coordination is not sufficiently developed are also expected to have lower QOL and various difficulties in everyday life.

The subjects of this study were 217 elementary school children in Tokyo, Japan (second grade: 48 boys and 52 girls; fifth grade: 56 boys and 61 girls). I assessed motor coordination, behavioral attributes, and QOL in the subject children by the following three parent-reported questionnaires: 1) Japanese version of the Developmental Coordination Disorder Questionnaire (DCDQ-J), 2) Strengths and Difficulties Questionnaire (SDQ), and 3) KINDL^R. DCDQ-J is composed of three sub-scales: control during movement, fine motor, and general coordination. SDQ is composed of five sub-scales: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and pro-social behavior. KINDL^R is composed of six sub-scales: physical, emotional, self-esteem, family, friends, and school. In addition, I directly observed the motor activities of the subject children to measure the coordinated motor activities: handwriting, use of scissors, ball handling, and rope jumping. I analyzed the questionnaire data and the clinical observation data by IBM SPSS 20.0 statistics Japanese version.

First, significant differences in sub-scales of motor coordination were found between age groups and sexes as follows: 1) Fine motor of girls was higher than that of boys in both the second and fifth grade, 2) “Act difficulty” of boys was higher than that of girls in the second grade, 3) Pro-social mental strength in girls was higher than in boys in the fifth grade, 4) School QOL in boys was higher than that of girls in the fifth grade. In addition, it was found that the median score of physical, self-esteem, and school QOL of girls in the second grade were higher than that of girls in the fifth grade.

Second, significant negative correlations were found between the scores of DCDQ-J and SDQ and between SDQ and KINDL^R. A significant positive correlation was found between the scores of DCDQ-J and QOL.

Third, development of fine motor coordination of girls was shown to be faster than that of boys by direct observation of motor coordination. In contrast, development of control during movement was shown to be higher in boys than girls.

Fourth, the number of sub-scales in which scores of parent-rated questionnaires and those of actual observations were significantly correlated was greater in boys than girls. In addition, correlation between QOL and scores of observed motor coordination was most significant in boys the second grade. Correlations between mental difficulties and observed motor coordinations in boys in fifth grade were also found to be most significant.

The results showed there were age and sex differences in motor coordination in children. The apparent differences indicate that it is necessary for young children to experience various movements in play and other daily activities. Furthermore, they revealed that motor coordination was correlated with behavioral attributes and QOL in school children especially relations between the sub-scales of fine motor and hyperactivity/inattention, fine motor and self-esteem, and control during movement and friends were most significant.

The results suggest that it is important for teachers not only to provide corrective measures for children's clumsiness but also to judge where the cause of the difficulties of behavioral attitudes. I hope that the findings in this study will help to understand the relation among mental health, QOL and motor coordination, and thus to be useful in the promotion of mental health and QOL of children.