Table 1. Demographics of Participants ( 4-6 Years Old; N=62)

|  |  |  |
| --- | --- | --- |
|  | Experimental group | Control group |
| n=31 |  | n=31 |
| Age (SD) | 5.12 (1.05) |  | 5.27(1.02) |
| Gender |  |  |  |  |  |  |  |  |
| Boys | 21(67%) |  | 22(71%) |
|  Girls | 10(33%) |  | 9(29%) |
| DD subtypeDevelopmental delay Cerebral palsy Intellectual disabilities Chromosome abnormalitiesClassification using MAND aNDI score <55NDI range 55-69 NDI range 70-85 |  | 13(42%)9(29%)7(22%)2(7%)5(16%)14(45%)12(39%) |  | 11(36%)10(32%)9(29%)1(3%) 4(13%)14(45%)13(42%) |

NOTE.

SD, standard deviation; MAND, McCarron Assessment of Neuromuscular Development

NDI, Neuromuscular Developmental Index

a Classification of children using the McCarron Assessment of Neuromuscular Development: NDI score<55 represents severe motor delay; 55-69 represents moderate motor delay; 70-85 represents mild motor delay; >85 represents typically developing children.

Table 2. Test scores and ANOVA results for each group (N=62)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Experimental group (n = 31) |  |  | Control group (n = 31) |
|  | Pre-test | Post-test | ANOVA |  | Pre-test | Post-test | ANOVA |
|  **Hand kinematics** | (SD) | (SD) | *F* | *P* |  | (SD) | (SD) | *F* | *P* |
| Wrist ROM (degree)b | -26.5 (19.8) | 2.4 (28.1) | 17.70*\** | .000 |  | -27.1 (25.7) | -15.3 (25.2) | 3.44 | .073 |
| MP ROM (degree)cPIP ROM (degree)dDIP ROM (degree)e | 34.7 (15.3)32.1(14.4)19.4(12.6) | 41.5 (5.3)20.7(5.5)13.8(6.7) | 4.94*\**18.23*\**8.95*\** | .034.000.005 |  | 33.5 (13.6)33.6(14.4)16.5(10.6) | 34.8 (13.8)29.4(12.7)14.4(8.3) | .383.682.11 | .540.065.157 |
| Press force (Ib) | 1.9 (0.8) | 2.0 (0.6) | .65 | .801 |  | 1.8 (0.7) | 9.5 (2.9) | .195 | .662 |
| **PPS performancea** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Space management | 13.7 (4.8) | 16.6 (3.2) | 11.39*\** | .002 |  | 13.3 (4.3) | 14.3 (3.5) | 2.80 | .105 |
| Material management | 22.8 (8.7) | 28.8 (5.5) | 14.62*\** | .001 |  | 24.2 (7.4) | 25.3 (6.0) | 1.90 | .177 |
| Pretense-symbolic | 25.1 (8.0) | 29.5 (4.2) | 11.75*\** | .002 |  | 25.2 (7.5) | 26.6 (5.7) | 3.73 | .063 |
| Participation | 24.0 (4.9) | 31.8 (7.0) | 19.23*\** | .000 |  | 23.2 (5.0) | 24.1(4.8) | .712 | .406 |

Note. ANOVA, analysis of variance

*\*P* < .05 (within-group comparison)

a PPS, Revised Knox Preschool Play Scale

b Max angle of wrist flexion (negative number: wrist palmar flexion; positive number: wrist dorsiflexion)

c Max angle of metacarpophalangeal joint (MP) flexion

d Max angle of proximal interphalangeal joint (PIP) flexion

e Max angle of distal interphalangeal joint (DIP) flexion

Table 3. ANOVA of the pre-test data and ANCOVA of the post-test data between the experimental and control groups (N=62)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pre-testUnivariate (ANOVA) |  | Post-testUnivariate (ANCOVA) |
|  | *F* | *P* | η2a | POWERb |  | *F* | *P* | η2a | POWERb |
| **Hand kinematics** |  |  |  |  |  |  |  |  |  |
| Wrist ROM | .010 | .921 | .000 | .051 |  | 6.91\*\* | .011 | .105 | .735 |
| MP ROMPIP ROMDIP ROM | .104.156.977 | .784.694.327 | .002.003.016 | .062.068.163 |  | 6.66\*\*13.16\*\*1.22 | .012.001.273 | .101.182.020 | .719.946.193 |
| Press force | .380 | .540 | .006 | .093 |  | .093 | .762 | .002 | .060 |
| **PPS performance** |  |  |  |  |  |  |  |  |  |
| Space management | .105 | .747 | .002 | .062 |  | 8.98\*\* | .004 | .132 | .839 |
| Material management | .439 | .510 | .007 | .100 |  | 10.04\*\* | .002 | .145 | .876 |
| Pretense -symbolic | .003 | .953 | .000 | .050 |  | 9.39\*\* | .003 | .137 | .854 |
| Participation | .407 | .526 | .007 | .096 |  | 25.17\*\* | .000 | .299 | .999 |

Note. ANOVA, analysis of variance; ANCOVA, analysis of covariance

\*\**P* < .05 (between-group comparison)

a. Effect size (η2): small η2 < .01–.05; moderate η2 = .06–.13; large η2 ≥ .14

b. Adequate study power, .8. The small study sample size may be the reason for the under-powered status of the study.