

Group versus Individual Fine Motor Therapy for Preschool-aged Children

Prepared by: Mimi Simon, OT (mimi.simon@alumni.ubc.ca)

Date: November 7, 2013

Review date: November, 2015

CLINICAL SCENARIO:

Group interventions are increasingly used in paediatric settings to address waitlists and fiscal challenges (Camden, Tetrault, & Swaine, 2012). For certain diagnostic groups, such as those with mild-moderate fine motor delays, the aim is to limit individualized sessions and focus on centre-based group therapy, with continuing caregiver education. This is a shift in how therapy is provided and raises questions about the effectiveness of group therapy for certain clientele.

FOCUSED CLINICAL QUESTION:

In preschool-aged children with fine motor delays, does fine motor group therapy compared with individual fine motor therapy result in greater improvement in fine motor skills

SUMMARY of Search, 'Best' Evidence' Appraised, and Key Findings

It was challenging to find studies that addressed all elements of the focussed clinical question. Ultimately the study by Davies and Gavin (1994) was the only one to meet all criteria, to a degree. This non-randomized experimental study concluded no statistical difference between group/consultation intervention compared with individual intervention when evaluating fine and gross motor gains in preschoolers with developmental delays.

Other studies of interest were found, though were only indirectly related to the clinical question. Many studies have explored efficacy of motor development interventions in young children (Reithmuller, Jones, & Okley, 2009). One systematic review evaluated interventions used in occupational therapy (OT) to promote motor performance in early childhood (Case-Smith, Frolek Clark, & Schlabach, 2013). However, few studies have compared group interventions with individual interventions for fine motor skills outcomes.

One related study compared group physical therapy (PT) to individualized PT in older children with developmental coordination disorder (DCD). Both interventions yielded similar gains in motor performance, including fine motor skills (Hung & Pang, 2010).

Additional studies have looked at effects of group motor skill intervention. Case-Smith (2000) found that OT sessions with preschoolers that incorporated play and peer interaction contributed to improvements in fine motor skills, and were the only significant predictors for fine motor outcomes. A study on preschoolers with DCD concluded that group motor skill intervention in conjunction with PT evaluation/consultation increased individual awareness of motor competence (Pless, Carlsson, Sundelin, & Persson, 2001). A related study, with that same sample, found that group intervention benefitted children with borderline motor difficulties, but not those with definite motor difficulties (Pless, Carlsson, Sundelin and Persson, 2000). The assessments used for the latter two studies included fine motor components such as cutting, tracing and drawing.

CLINICAL BOTTOM LINE:

While more research is required, group intervention, in conjunction with consultation services, may be as effective as individual intervention for preschoolers with fine motor

delays, and may offer other advantages.

Limitation of this CAT: This critically appraised paper was prepared for a graduate course assignment and has not been peer-reviewed except by the course instructor.

SEARCH STRATEGY:

Terms used to guide Search Strategy:

- **P**atient/Client Group: Preschool-aged children with fine motor delays
- **I**ntervention (or Assessment): Group fine motor therapy
- **C**omparison: Individual fine motor therapy
- **O**utcome(s): Improvements in fine motor skills

Databases and Sites Searched	Search Terms	Limits Used
Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects, Cochrane Register of Controlled Trials	Fine motor.mp or hand skill.mp or motor skill*.mp or hand function.mp AND group therapy.mp	English
Medline OvidSP, EMBASE OvidSP	Motor Skills/ or Motor Skills Disorders/rh, th [Rehabilitation, Therapy] or Psychomotor Performance/ or motor dysfunction/ or motor control/ or motor performance/	English, preschool child

	<p>or child development/ or developmental disorder/ or motor development/ or fine motor.mp or hand skill*.mp or hand function.mp</p> <p>AND</p> <p>Treatment outcome/ or group treatment.mp or group intervention.mp or group therapy.mp or group therapy/</p>	
CINAHL	<p>(MH "Motor Skills") or (MH "Motor Skills Disorders/TH") or "fine motor" or "hand skill*" or "hand function"</p> <p>AND</p> <p>(MH "Pediatric Occupational Therapy") or (MH "Hand Therapy") or (MH "Pediatric Physical Therapy") or "group therapy" or (MH "Treatment Outcomes") or "group treatment" or (MH "Early Intervention") or "group intervention"</p>	<p>English, preschool child, Exclude MEDLINE records</p>
OTseeker	<p>"fine motor" or "hand skills" or "hand function" or "motor development"</p>	<p>Pediatric/adolescent</p>
PEDro	<p>"fine motor" or "motor skill" or "motor skill" child or "motor skill preschool"</p>	<p>none</p>

PsycINFO	<p>(DE "Fine Motor Skill Learning" OR DE "Perceptual Motor Learning" OR DE "Perceptual Motor Coordination" OR DE "Motor Coordination" OR DE "Perceptual Motor Development" OR DE "Perceptual Motor Processes" OR DE "Motor Skills" OR DE "Motor Processes" OR DE "Motor Performance" OR DE "Motor Development" OR DE "Apraxia" OR DE "Dyspraxia" OR DE "Delayed Development" OR DE "Early Childhood Development" or "fine motor" or "hand function" or "hand skill*" AND preschool or preschool child* or toddler* AND (((DE "Group Participation" OR DE "Group Intervention") OR (DE "Group Instruction")) OR (DE "Occupational Therapy")) OR (DE "Treatment Outcomes") or group therapy or group treatment</p>	none
----------	--	------

Note. DE = descriptor, MH = subject heading, .mp = multi-purpose field (title, full text, keywords), * = truncation (e.g. “s”, “ren”).

INCLUSION and EXCLUSION CRITERIA

- Inclusion:
 - Children aged 2-5 years
 - Delayed fine motor skills
 - Diagnosis of developmental delay; developmental coordination disorder, syndromes
- Exclusion:
 - Primarily neurological disorder, muscular disorder or orthopaedic injury (e.g. cerebral palsy, muscular dystrophy, fracture)
 - Constraint induced movement therapy

RESULTS OF SEARCH AND BEST EVIDENCE

No relevant studies were located via the above search; however several related articles were generated including systematic reviews. From one review, the reference list revealed the only relevant study, a non-randomized experimental control trial by Davies and Gavin (1994). This study was the only one that addressed all elements of the focused clinical question. Therefore, it was identified as the ‘best’ evidence and selected for critical appraisal. According to the National Health and Medical Research Council (NHMRC) hierarchies of evidence, this study would rate as Level III-2 (NHMRC, 2008).

SUMMARY OF BEST EVIDENCE

Table 1: Description and appraisal of *Comparison of individual and group/consultation treatment methods for preschool children with developmental delays* by Davies & Gavin, 1994.

Aim/Objective of the Study:

To compare “the effectiveness of an alternate treatment method (group/consultation) to traditional direct therapy” (Davies & Gavin, 1994, p. 155). The authors describe four questions they hope to address related to this alternate treatment method.

Study Design: Non-randomized experimental trial.

Setting: Four different preschool classrooms in Wichita, Kansas, U.S.A.

Participants: Twenty students were selected from the preschool program for children with disabilities at the Institute of Logopedics based on the following criteria: 3-5 years of age, hearing/vision acuity within normal limits, fine or gross motor delays at least one standard deviation below their age norm as per the Peabody Developmental Motor Scales (PDMS), enrolled in the preschool program at least 60 days prior to start of study, diagnosis of developmental delay. Exclusion criteria: diagnosis of cerebral palsy.

Following initial assessments, children were divided into two groups of ten, matched on age, intelligence quotient (IQ) and degree of motor delay. Each group was split into two classrooms. For the group therapy/consultation group, two children were unavailable for final assessments and dropped from the study, therefore N=18. This loss of subjects did not result in statistically significant differences between the means on any measures used to match the groups.

Intervention/Phenomenon Investigated:

Subjects assigned to individual therapy received two 30 minute sessions of OT and two 30 minute sessions of PT per week. All sessions were conducted by the therapists in their clinics. Subjects assigned to the group/consultative method received one 30 minute OT group session and one PT group session per week in the classroom. A classroom staff member was present and encouraged to participate in the sessions and carry out the therapeutic activities at other times during the week. The therapists provided consultation to classroom staff,. Most of the OT groups/consultations were held in the classroom. Most of the PT groups/consultations were conducted in the clinic. The total number of hours or weeks was not reported.

Assessments were administered within the first three weeks of the fall term and seven months later during the spring term.

Outcome Measures/Qualitative Methods:

Three standardized assessments were used and all evaluators were blinded to the treatment method assignment.

Motor development levels were measured using the PDMS. These were administered by occupational therapists (fine motor portion) and physical therapists (gross motor portion) not involved in providing the interventions. Both skill sets can be assessed and scored independently and raw scores can be translated to other scales "for comparison of test results to previous assessments or the normal distribution of typically developing children" (Davies and Gavin, 1994, p. 156).

Functional skills were measured by the Vineland Adaptive Behaviour Scales, Interview Edition. Four domains of adaptive functioning are assessed: communication, daily living skills, socialization and motor skills. The motor subscales include both fine and gross motor sub-domains. The form was completed by the same person, usually the child's mother. Scores "are reported in terms of a standardized scale in which the mean of the normal distribution of typically developing children is 100 and the population's standard deviation is 15 points"

(Davies and Gavin, 1993, p. 157). The same format of reporting scores is used in the third assessment, the Central Institute for the Deaf Preschool Performance Scale, which measures nonverbal intelligence.

Main Findings:

In regards to the four questions the authors aimed to address:

1. Preschool children receiving OT and PT services demonstrated statistically significant gains in fine motor and gross motor skills.
2. The motor gains achieved by children in individual therapy sessions were not statistically different than those receiving group therapy/consultation.
3. The motor gains observed during clinical assessments were also observed in the child's home, as per results of the Vineland.
4. "The rate of motor skill development approximated that of the normal distribution of typically developing children" (Davies and Gavin, 1994, p. 160).

	Method	Initial		Final		Difference	p<
		Mean	SD	Mean	SD		
PDMS - Fine motor Scaled Scores	I	509.3	31.93	522.00	37.62	12.70	.01
	GC	517.88	29.40	536.75	33.33	18.88	.01
PDMS – Fine motor DMQ scores	I	32.45	39.83	31.80	39.26	-0.65	NS
	GC	50.26	24.07	42.63	35.71	-7.63	NS
Vineland Motor Scales	I	67.70	12.8	80.60	16.04	12.90	.01
	GC	75.25	12.38	84.75	15.15	9.5	.05

Note. DMQ = developmental motor quotient, GC = Group/Consultation method (n=8), I = Individual method (n=10), NS = Not statistically significant with alpha level of 0.5,

PDMS = Peabody Developmental Motor Scales, SD = standard deviation.

With a focus on the PDMS fine motor outcomes, analysis of variance tests revealed significance for main effect of assessment period ($F(1, 16) = 39.11, p < .001$) and no significance for main effect for treatment methods ($F(1, 16) = .56$) or interaction between treatment method and assessment period ($F(1, 16) = 1.50$). For fine motor DMQ scores, there was no significance for main effects of assessment period ($F(1, 16) = .60$), treatment methods ($F(1, 16) = .79$) or interaction ($F(1, 16) = .43$).

For the Vineland, composite and subscale scores showed no significant difference between treatment methods. Main effect of assessment period was significant for composite scores and three of the subscales: including socialization, communication and motor skills. None of the interactions were significant. Mean scores showed improvements made by both treatment methods were significant except for the daily skills subscale.

Original Authors' Conclusions:

Based on assessments used, there were no statistically significant differences between the individual therapy and group therapy/consultations. Since most gains obtained were larger for the former method, further studies that employ more rigorous methodology may offer additional evidence. Regardless, motor gains are achieved when OT and PT are included in a preschool program.

Critical Appraisal:

Validity

Sample bias: Subjects were referred to the preschool program. Groups were matched though it is unclear how they were assigned to the four classrooms. Bias might have occurred with allocation to the study and to the groups. Sample size was not justified.

Measurement bias: No justification was provided for selection of the outcome measures (i.e. that they were considered the most valid/reliable). Authors did note that the Vineland is subjective.

Co-intervention bias: There was no discussion if subjects were receiving additional interventions (e.g. if there was treatment/presence of co-existing diagnoses or use of medications). It is not known if the therapists providing individual therapy had contact with teachers to discuss the children.

Site of treatment and different therapists/teachers: Each classroom had a different teacher, therefore the amount of motor activities utilized within the regular classroom schedule and the teacher's ability to incorporate the therapists' suggestions might have affected outcomes. The physical setting of each classroom and each therapist's clinic are likely variable. Also, different therapists are involved in providing the interventions.

Timing of intervention: The authors acknowledge that without a control group, it is unclear whether the gains made were due to the therapy or maturation.

Blinding: Therapists and teachers were not blinded to group allocation.

Intention to treat analysis was not addressed.

Interpretation of Results

The groups were similar at baseline; however, the authors acknowledge an issue with subject selection - the children in each group had an initial wide range of motor skill levels, contributing to large between group error terms. The number of outcome measures increased the likelihood of a Type 1 error, however ANOVA was appropriate to use as three or more sets of observations were made on a sample. Gains made by children in both treatment methods appear to be statistically significant; however effect sizes and confidence intervals were not provided. As a result, size and precision of the intervention effect cannot be ascertained.

Summary/Conclusion:

The authors declare that “the clinical implications of the significant gains were evaluated through the use of the DMQs...” (Davies and Gavin, 1994, p. 160). Changes in the rates of development for both groups were not statistically significant. The authors propose that group/consultation therapy may be as effective as individual therapy. However, they acknowledge limitations in methodology, including lack of a control group, and suggest future studies be conducted over a longer time period, in addition to improved subject selection. This writer also identified several existing and potential biases, reducing the internal validity of this study. Future studies on this topic are needed.

IMPLICATIONS FOR PRACTICE, EDUCATION and FUTURE RESEARCH

Paediatric group interventions for fine motor skills are offered by both public and private occupational therapists. Some might consider this an effective means of delivering services. Although groups are presumed to be more cost effective than individual interventions, few studies support this hypothesis (Camden et al, 2012).

Although the study by Davies and Gavin (1994) was selected as best evidence to address my clinical question, the study was not ideal. The sample size is small and is not reflective of the population with which I do fine motor group work (e.g., children with global developmental delay or autism spectrum disorder). Also, consultation services were studied in combination with group therapy. Therefore, it is not clear to what degree the outcomes were due to group intervention alone.

Despite the limitations, there are reported benefits of group therapy. As such, I would not discount group therapy as an alternate to individual therapy for children with fine motor delays; however, further study is needed. Examples include studies that examine the cost of group versus individual therapy, demonstrate group effectiveness with similar populations

and describe beneficial aspects of group service (e.g. in relation to therapy approach, therapist/child ratio, desired outcomes and the role of peers). This knowledge could be utilized in planning for effective group intervention and for communicating evidence with client families, clinicians and other stakeholders.

REFERENCES

- Camden, C., Tetrault, S., & Swaine, B. (2012). Increasing the use of group interventions in a pediatric rehabilitation program: Perceptions of administrators, therapists, and parents. *Physical and Occupational Therapy in Pediatrics, 32* (2) 120-135.
- Case-Smith, J. (2000). Effects of occupational therapy services on fine motor and functional performance in preschool children. *The American Journal of Occupational Therapy, 54*, 372-380.
- Case-Smith, J, Frolek, G. J., & Schlabach, T. L. (2013). Systematic review of interventions used in occupational therapy to promote motor performance for children ages birth-5years. *The American Journal of Occupational Therapy, 67*, 413-424.
- Davies, P. L. & Gavin, W. J. (1994). Comparison of individual and group/consultation treatment methods for preschool children with developmental delays. *The American Journal of Occupational Therapy, 48*, 155-161.
- Hung, W. W. Y, & Pang, M. Y. C. (2010). Effects of group based versus individual-based exercise training on motor performance in children with developmental coordination disorder. *Journal of Rehabilitation Medicine, 42*, 122-128.
- National Health and Medical Research Council (NHMRC). NHMRC additional levels of evidence and grades for recommendations for developers of guidelines. 2008. Online. Available: <http://www.nhmrc.gov.au> (7 Nov 2008).
- Pless, M., Carlsson, M., Sundelin, C., & Persson, K. (2000). Effects of group motor skill

intervention on five- to six- year old children with developmental coordination disorder.

Pediatric Physical Therapy, 12, 183-189.

Pless, M., Carlsson, M., Sundelin, C., & Persson, K. (2001). Preschool children with developmental coordination disorder: self-perceived competence and group motor skill intervention. *Acta Paediatric*, 90, 532-538.

Riethmuller, A. M., Jones, R. A., & Okley, A.D. (2009). Efficacy of interventions to improve motor development in young children: A systematic review. *Pediatrics*, 124: e782.