

A CLINICAL TRIAL OF THE PROCESS-ORIENTED TREATMENT APPROACH FOR CHILDREN WITH DEVELOPMENTAL CO-ORDINATION DISORDER

Helene J. Polatajko
Jennifer J. Macnab
Bev Anstett
Theresa Malloy-Miller
Kathleen Murphy
Samuel Noh

According to current prevalence estimates, (Gubbay 1978, Keogh *et al.* 1979, American Psychiatric Association 1987, Iloeje 1987), 5 to 6 per cent of school-aged children can be expected to have developmental co-ordination disorder (DCD). This diagnostic category, which appeared for the first time in DSM-III-R, refers to children who 'have marked impairment in the development of motor coordination that is not explainable by Mental Retardation and that is not due to a known physical disorder' (American Psychiatric Association 1987).

While the diagnostic category is relatively new, the condition has existed for many years. It has been described under various labels, including clumsy child syndrome, mild motor problems, inco-ordination, developmental apraxia, perceptual motor dysfunction and minimal brain dysfunction (Gubbay 1978; Lord and Hulme 1978*a, b*, 1988; Henderson and Hall 1982; Ayres 1985; Cermak 1985, 1988; Laszlo and Bairstow 1985*b*; Njokiktjien 1988).

It is clear to paediatricians, psychologists, educators and rehabilitation therapists alike that DCD can have serious consequences for a child's social, emotional and educational function, and that successful management of this problem is imperative (Gubbay 1975, Gordon and McKinlay 1980, Henderson and Hall

1982, Laszlo *et al.* 1989). However, relatively little work has been done to identify the cause of the disability, and hence the most appropriate evaluation and treatment methods are still elusive. The treatment approaches that have emerged have been based largely on clinical experience and assumptions about normal motor learning.

At present, there are two basic approaches used in clinical practice: the perceptual-motor (PM) approach—what Laszlo and Bairstow (1985*b*) referred to as the task-oriented approach—and the sensory integrative (SI) approach (Polatajko *et al.* 1992). A recently completed clinical trial (Polatajko *et al.* 1991) compared the effectiveness of the PM and SI approaches in improving the motor performance of learning-disabled children with delayed motor function. Because both approaches resulted in improved motor performance to an equal extent, the data neither supported nor refuted either explanation. Other studies have found similar results (see Polatajko *et al.* 1992 for a discussion of the literature).

Laszlo and Bairstow (1985*b*) proposed a process-oriented treatment (POR) approach to DCD. Their data, from a series of studies, suggested that children with DCD have poor kinaesthetic awareness. Laszlo *et al.* (1989) found that

children identified by teachers as having mild motor difficulties can show dramatic improvement in their motor performance after only brief periods of training with specifically designed kinaesthetic training activities. Furthermore, results from the (POR_x) approach were significantly better than those from a general motor programme.

Laszlo and Bairstow appeared to have offered a promising approach to the treatment of DCD. POR_x takes considerably less time than current therapeutic approaches, can be taken into the community, requires no special training on the part of the therapist and, most importantly, appears to have dramatic effects on various types of motor function. However, the results supporting the POR_x approach were preliminary. Before the study reported here, the studies had neither been replicated nor been attempted with a clinical population of children with DCD.

The purpose of this study was to determine whether POR_x is indeed an effective treatment alternative to the traditional approach used by therapists when treating children with DCD. The study examined the effects of POR_x on a clinical sample of children with mild motor problems (*i.e.* with DCD). A randomized clinical trial was carried out to determine the relative merits of the POR_x approach proposed by Laszlo and Bairstow (1985*b*) for improving the motor performance of children with DCD, immediately after treatment and six weeks later.

Method

STUDY DESIGN

The design was a three-group randomized clinical trial (RCT) with pretest, post-test and follow-up assessments administered by an independent rather, blind to the group status of the children.

The POR_x group consisted of children treated with the experimental kinaesthetic training programme designed by Laszlo and Bairstow (1985*a*). Children in the traditional group underwent the typical sensorimotor programmes currently used by therapists treating children with DCD. Finally, children in the no-treatment group received no treatment of any kind for their motor problems, but were

offered therapy after completing follow-up assessment.

The hypothesis tested was that children with clinically identified DCD who were treated with POR_x would not perform significantly better on tests of kinaesthesia and motor performance, either immediately after treatment or at follow-up, than children with DCD who received traditional treatment or none at all.

SUBJECTS

The definition of DCD does not provide operational criteria, and currently there is no standard method for establishing the diagnosis (Henderson 1987, Sugden and Keogh 1990). Therefore the following inclusion/exclusion criteria were used, consistent both with those used by Laszlo and Bairstow (1985*a, b*) and with those used in standard clinical practice.

Children were included if they were at least seven years old but under 13 years old at the time of intake; if they were of normal intelligence, *i.e.* with a Verbal or Performance IQ of at least 85 on the WISC-R (Wechsler 1974) or equivalent on another standard measure of intelligence; if they had motor problems (\leq -1SD on the fine motor, gross motor or composite scores of the Bruininks-Oseretsky Test of Motor Proficiency) (Bruininks 1978) and deficient performance rating on the tasks of Ayres' clinical observations (Ayres 1972); if they had hearing and vision, or corrected vision, within normal limits; and if parental consent had been obtained. Children were excluded if they had received or were receiving occupational or physical therapy for the treatment of motor problems, or if they had been diagnosed as having a specific neurological disorder or physical or sensory deficits causing the motor problem.

Sample size

An effect of ≥ 1 SD was reported by Laszlo *et al.* (1989). To replicate such a large effect, with alpha set at 0.05 (two-tailed) and power at 0.9, 21 children per group were required (for a total of 63). The intake target was set at 25 per group (75 in total) to allow for a loss of four per group, a loss of 12 in total. (Experience in previous RCTs suggested that this was a reasonable estimate of loss—see Polatajko *et al.* 1991.)

PROCEDURE

The sample was drawn from children referred to the Home Care School Health Support Program. A case manager referred children with motor problems directly to two local treatment centres for occupational therapy assessment of their motor problems. The children were screened for inclusion and exclusion criteria by the intake therapists using information from client charts and their own assessment results. Only children who met the inclusion/exclusion criteria were randomly assigned to one of the three intervention groups. Parents choosing not to have their child included in the clinical trial had access to the agency's other services.

Randomization was carried out by the research assistant using a blocked randomization procedure. The children were randomly assigned to one of the three interventions in blocks of six, according to their age (seven to eight years, nine to 10 years, and 11 to 12 years). This procedure ensured that each intervention group had roughly similar age distributions. The research assistant was not directly involved with the intervention or the pretest, post-test or follow-up assessments.

All children, regardless of group assignment, were tested on three occasions by an independent evaluator, blind to the group status of the children. Three separate evaluators were used in the course of the study. Inter-rater reliability ranged from 0.9924 to 0.9999. The children were tested three times: pretest within two weeks before the start of treatment; post-test within two weeks after the end of treatment—*i.e.* after 24 sessions (nine weeks) for the traditional group, after a maximum of 12 sessions (five weeks) for the POR_x group, and after five weeks for the no-treatment group; and follow-up, carried out six weeks after the end of treatment (*i.e.* 15, 15 and 11 weeks after the pretest assessment for the traditional, POR_x and no-treatment groups, respectively). The time between the pretest and follow-up assessments was not the same for all groups, since the two active treatment alternatives had inherently different time requirements. However, the time between cessation of

treatment and follow-up assessment remained constant across the three groups, so that any maintenance effects of treatment could be assessed over similar periods of time.

INTERVENTION

All of the treatment was provided by occupational therapists from the two treatment centres, usually in the child's school. All of the therapists were experienced in the traditional methods of intervention and had also attended a training seminar on the POR_x intervention, as this was not an approach they habitually used. The therapists were asked to keep careful records of the actual treatment provided in each session, so that it could be verified that each child had received the appropriate therapy.

Children in the POR_x group received kinaesthetic training as described by Laszlo and Bairstow (1985a), using the kinaesthetic acuity, kinaesthetic perception and memory apparatus developed by them. For kinaesthetic acuity, each child was trained to discriminate a 20° difference in height between arm movement up two runways with eyes closed. The angle of separation was gradually reduced by 2° until an 8° difference in height could be discriminated consistently (see Laszlo and Bairstow 1985a for illustrations). Training in kinaesthetic perception and memory involved reorienting a pattern to its original position. Training began with the child moving a stylus, with eyes closed, through the easiest pattern (a straight line). Once a child could re-orient a pattern within a 20° error limit, the next pattern was introduced. This continued until all four patterns had been mastered. Training took place in one-to-one sessions with the therapist two or three times per week, each lasting about 20 minutes. Treatment continued for a maximum of 12 sessions, usually over a period of five weeks, or until the children could perform the task to criteria (whichever came first). Although it was anticipated that the criterion of kinaesthetic awareness would be achieved in three to five sessions (Laszlo *et al.* 1989), actually children required anything between five and 12 sessions of training, with a mean of 7.26 sessions. Children in this group were

involved in the study for approximately 11 weeks.

Children in the traditional group received occupational therapy programmes designed to meet their specific motor needs. This treatment could consist of any combination of a variety of sensory integrative, gross motor, fine motor and perceptual-motor activities, except POR_V , that met the specific motor needs of the individual child. The sensory integrative activities involved equipment such as scooter boards and bolster swings. The perceptual-motor activities involved equipment such as peg boards, balance beams and painting materials. Children were seen at one-to-one sessions, two or three times per week (*i.e.* about the same as with POR_V treatment), for approximately 45 minutes per session (*i.e.* longer than with POR_V treatment) for a total of 24 sessions over a period of approximately nine weeks. Children in the traditional group were involved in the study for approximately 15 weeks.

The children in the no-treatment group did not receive any therapy for their motor problems for an 11-week period. During this time, they were seen only for the purposes of assessment. At the end of the 11-week period, after follow-up assessment, these children left the study and were given whatever services the therapists considered appropriate. In most cases the children were given a traditional programme of treatment.

Subject compliance was quite high over the course of this study. Of the 76 children having pretest assessment, only two (both in the traditional group) withdrew during therapy. All of the remaining 74 children were available for post-test assessment and at follow-up.

OUTCOME MEASURES

We used standardized measures of visual-motor or motor function, typically used in clinical practice, and the measures of kinaesthesia developed by Laszlo and Bairstow (1985a), as follows.

Kinaesthetic Sensitivity Test (KST)

This is a process-oriented test developed by Laszlo and Bairstow (1985a) of kinaesthetic function consisting of two

tasks, KST Runway and KST Pattern, designed to measure the two components of kinaesthetic information processing. The KST Runway task measures kinaesthetic acuity, the accuracy of discrimination of movement and position of the upper limbs. It is concerned with spatial discrimination and is not relevant to other dimensions of kinaesthesia. The KST Pattern task measures kinaesthetic perception and memory, the accuracy of perception and memory of the orientation of complex movement pattern. The task is concerned with perceiving directional changes in arm movement and memorizing the perceived spatial configuration of the movement pattern. Data for the runway task are recorded as the number of runway pairs that the subject can distinguish correctly out of a possible 32. Data for the Pattern task are recorded as an error score. Therefore improvement is reflected by a decrease in score. Both of these tasks were normed on male and female children aged five to 12 and on adults.

Developmental Test of Visual-Motor Integration, Revised (3R) (VMI)

This test of visual-motor integration (Beery 1989) was normed on two- to 15-year-old children, and is used to assess visual-motor skills. Visual-motor age-equivalent scores, standard scores and centiles can be calculated; however, in this study all analyses were carried out using raw scores. This test is frequently used in clinical practice and has adequate psychometric properties.

Test of Motor Impairment (TOMI)

This is a standardized test of motor impairment for children from five to 11 years of age and older (Stott *et al.* 1984). It consists of eight fine and gross motor items that are grouped into three subtests: Manual Dexterity, Ball Skills, and Static and Dynamic Balance. The subtests were looked at separately for the purposes of data analysis. A decrease in a child's score corresponds with an improvement in motor ability. This test was chosen because it was the motor test used by Laszlo and her colleagues and has adequate psychometric properties.

Southern California Sensory Integration Test (SCSIT)

This is a standardized test comprising 17 subtests (Ayres 1972). The two subtests used in this study were Kinaesthesia and Finger Identification. Kinaesthesia (KIN) is intended to measure the capacity to perceive joint position and movement. It was normed on children aged from four to eight years. It provides standard scores for both hands and a total score; however, all analyses were carried out using the total raw score. Finger Identification is intended to measure a child's ability to integrate information about light touch. The child is required to point to the finger which the examiner touched previously while the child's vision was occluded. It provides standard scores for both hands and a total standard score. The total raw score was used for purposes of data analysis. These tests have been included as an alternative measure of kinaesthetic function and as a measure of tactile discrimination.

All pretest and follow-up assessments included all the outcome measures, while during the post-test assessment the TOMI was omitted. The TOMI was only administered at the pretest and follow-up assessments, as the sensitivity of this test was not considered appropriate for shorter intervals.

ANALYSES

Before the data were analysed for study results, analyses were completed to check the pretest comparability of the groups on the outcome measures. This was done to examine the need for covariates and to confirm the adequacy of our randomization. Multivariate analysis of variance for repeated measures was used to assess the differences between the groups and across time, and to determine what contributed to the difference. Duncan's multiple range test was used where indicated for *post hoc* analysis. The criterion for significance was set at $p < 0.05$. When a multivariate test was used, Wilks lambda is reported.

Results

SAMPLE DESCRIPTION

Seventy-nine families agreed to allow

their children to participate in the study. However, three withdrew after being assigned to the no-treatment group, leaving an intake sample of 76. After randomization, there were 26 children in the POR_x group, 26 in the traditional group and 24 in the no-treatment group. Two of the children in the traditional group dropped out during treatment, reducing the sample size in the traditional group to 24 at post-test and follow-up, so the overall sample size at post-test and follow-up was 74. Not surprisingly in a clinical trial, however, a few post-test and follow-up assessments could not be completed on some children due to illness or attention irregularities: therefore the actual post-test and follow-up sample sizes ranged from 72 to 74, depending on the measure. All post-test and follow-up sample sizes were well within the target of 63 established for this study.

Seventy-six children with DCD (54 boys and 22 girls) entered the study. All the children met all intake criteria. The children were between the ages of seven and 12 (mean 9.06) years and had motor problems. Indeed, the sample mean for the TOMI total score was 8.72, indicating substantial motor impairment (see Table I for TOMI subtest scores). The children also performed poorly on VMI and both KST subtests (Table I).

Table I shows how the children performed in the three groups at the pretest assessment on each of the outcome variables, and also gives the results of the pretest comparisons on these variables. There were no significant group differences on any of the outcome measures.

POST-TREATMENT AND FOLLOW-UP

The effect of group, time and the interaction of the two at post-test and follow-up were tested using a repeated measures MANOVA from the pretest to the post-test and to the follow-up assessments. The results are reported separately for each variable (Table II).

For the KST Runway task, the means, standard deviations and results of the MANOVA and *post hoc* analyses are shown in Table II. There was a significant difference between the groups ($F(2, 71) = 6.20, p < 0.05$) and over time (Wilks lambda = 0.9175, approximate $F(2, 70) =$

TABLE I
Comparison of three groups at pretest assessment

| | <i>POR_x</i> (N=26) Mean (SD) | <i>Traditional</i> (N=24) Mean (SD) | <i>No-treatment</i> (N=24) Mean (SD) | <i>ANOVA</i> F(df) |
|----------------------------------|---|---|--|-----------------------|
| KST—Runway | 20.31 (4.19) | 19.42 (4.19) | 19.71 (3.01) | 0.36 (2, 73) |
| KST—Pattern (mean error) | 55.64 (23.78) | 60.44 (23.63) | 63.56 (27.31) | 0.64 (2, 73) |
| VMI | 16.62 (8.43) | 14.92 (6.42) | 14.13 (5.48) | 0.85 (2, 73) |
| TOMI—Dexterity (impairment) | 3.19 (1.63) | 3.77 (1.86) | 3.40 (1.74) | 0.73 (2, 73) |
| TOMI—Ball Skills (impairment) | 2.46 (1.39) | 1.77 (1.42) | 1.94 (1.17) | 1.89 (2, 73) |
| TOMI—Balance (impairment) | 3.38 (1.91) | 3.12 (1.51) | 3.10 (2.16) | 0.18 (2, 73) |
| Kinaesthesia | 70.15 (10.33) | 75.88 (7.88) | 71.13 (14.01) | 2.03 (2, 73) |
| Finger Identification | 12.31 (2.77) | 12.58 (2.27) | 12.75 (1.96) | 0.22 (2, 73) |

TABLE II
Comparison of three groups at post-test and follow-up assessments

| | <i>POR_x</i> Mean (SD) | <i>Traditional</i> Mean (SD) | <i>No-treatment</i> Mean (SD) | <i>MANOVA (F)</i> Group Group×time Time | | |
|-----------------------|-------------------------------------|---------------------------------|----------------------------------|--|-------|-------|
| KST—Runway | | | | | | |
| Post-test | 23.92 (5.64) | 19.58 (3.18) | 20.42 (4.31) | 6.20* | 1.60 | 3.15* |
| Follow-up (N=74) | 22.65 (5.79) | 18.83 (4.34) | 20.61 (4.97) | | | |
| KST—Pattern | | | | | | |
| Post-test | 50.85 (23.89) | 51.56 (18.75) | 59.80 (24.25) | 2.07 | 0.30 | 1.70 |
| Follow-up (N=74) | 50.82 (22.60) | 55.23 (23.75) | 65.56 (28.78) | | | |
| VMI | | | | | | |
| Post-test | 18.64 (8.78) | 15.42 (5.38) | 13.86 (3.93) | 1.53 | 2.34† | 1.57 |
| Follow-up (N=71) | 15.96 (7.72) | 13.92 (4.85) | 15.23 (6.13) | | | |
| TOMI—Dexterity | | | | | | |
| Post-test | 3.19 (1.63) | 3.54 (1.84) | 3.40 (1.74) | 0.20 | 0.59 | 0.00 |
| Follow-up (N=73) | 3.27 (1.57) | 3.27 (1.64) | 3.50 (1.61) | | | |
| TOMI—Ball Skills | | | | | | |
| Pre-test | 2.46 (1.39) | 1.92 (1.38) | 1.94 (1.17) | 1.76 | 1.87 | 1.49 |
| Follow-up (N=74) | 2.17 (1.36) | 1.48 (1.23) | 2.15 (1.35) | | | |
| TOMI—Balance | | | | | | |
| Pre-test | 3.39 (1.91) | 3.13 (1.58) | 2.98 (2.07) | 0.39 | 0.06 | 0.20 |
| Follow-up (N=73) | 3.19 (1.64) | 3.02 (1.33) | 2.89 (1.69) | | | |
| Kinaesthesia | | | | | | |
| Post-test | 74.23 (8.66) | 75.71 (7.95) | 72.70 (12.78) | 1.53 | 0.49 | 2.67 |
| Follow-up (N=73) | 74.54 (10.39) | 77.50 (8.31) | 74.22 (12.87) | | | |
| Finger Identification | | | | | | |
| Post-test | 12.39 (2.33) | 13.25 (1.82) | 11.83 (2.48) | 0.16 | 2.89* | 1.22 |
| Follow-up (N=73) | 12.73 (2.20) | 12.71 (1.94) | 13.09 (2.02) | | | |

*Significant at $p < 0.05$.

†Approaches significance, $p = 0.058$

3.15, $p < 0.05$). *Post hoc* analysis revealed that the POR_x group improved significantly ($p < 0.05$) from pretest to post-test,

and that this significant improvement was maintained at follow-up. The improvement in the POR_x group at the post-test

assessment was significantly greater than in either the traditional or the no-treatment groups, and the significant difference between the POR_X group and the traditional group was maintained at follow-up.

In the KST Pattern task, no significant differences were found (Table II) either between the groups ($F(2, 71) = 2.07$) or across time (Wilks lambda = 0.9536, approximate $F(2, 70) = 1.70$).

In the VMI test, two subjects were unable to complete the post-test assessment and one subject was unable to complete follow-up testing. These three subjects were excluded from the repeated measures analysis (Table II). No significant differences were found for the VMI either between groups ($F(2, 68) = 1.53$) or across time (Wilks lambda = 0.9552, approximate $F(2, 67) = 1.57$). The group \times time effect approached significance (Wilks lambda = 0.8735, approximate $F(4, 134) = 2.34, p=0.058$). *Post hoc* analysis revealed a significant difference between the POR_X group and the no-treatment group at the 0.05 level for the post-test assessment. The POR_X group scored significantly higher than the no-treatment group, but this difference was not maintained at follow-up.

In the Dexterity subtest of the TOMI, one subject from the traditional group was unable to undergo the follow-up assessment and was therefore excluded from the MANOVA (Table II). No significant differences were found on the subtest of manual dexterity, either between groups ($F(2, 70) = 0.2$) or across time ($F(1, 70) = 0.0$).

No significant differences were found for the Ball Skills subtest (Table II), either between groups ($F(2, 71) = 1.76$) or across time ($F(2, 71) = 1.49$).

In the Balance subtest of the TOMI, one subject whose follow-up test was incomplete was excluded from the MANOVA (Table II). There were no significant differences between groups ($F(2, 70) = 0.39$) or across time ($F(1, 70) = 0.36$).

In the kinaesthesia subtests of the SCSIT, one subject from the no-treatment group was unable to undergo the follow-up assessment and was excluded from the repeated measures analysis (Table II). No significant differences

were found for KIN between groups ($F(2, 70) = 1.53$) or across time (Wilks lambda = 0.9282, approximate $F(2, 69) = 2.67$).

In the Finger Identification subtest, one subject from the no-treatment group was unable to complete all phases of testing and was excluded from the repeated measures analysis (Table II). No significant differences were found between groups ($F(2, 70) = 0.16$) or across time (Wilks lambda = 0.9674, approximate $F(2, 69) = 1.16$). The group \times time interaction was significant at the 0.05 level (Wilks lambda = 0.8514, approximate $F(4, 138) = 2.89$). *Post hoc* analysis revealed a significant difference between the traditional group and the no-treatment group at the 0.05 level for the post-test assessment. The traditional group scored significantly higher than the no-treatment group, but this difference was not maintained at follow-up.

In summary, the results of this study were mixed. Whether the outcome was positive or negative depended on the variable being examined. For the KST Runway variable kinaesthetic acuity, the children in the POR_X group showed significantly more improvement than any of the other children at the post-test assessments and more improvement than the children in the traditional group at follow-up. For the VMI variable visualmotor integration, the POR_X group did better than the no-treatment group at post-test, but did not maintain its superiority at follow-up. For the remaining variables, there was no clear advantage of treatment for the children in any of the three groups.

Discussion

The results of this study were quite different from those reported by Laszlo *et al.* (1989). The children in this study receiving POR_X did not perform any differently from either the children receiving traditional treatment or no treatment, at either the post-test or follow-up assessments on any of the variables measured other than kinaesthetic acuity, the task which children receiving the POR_X intervention were trained for. While this difference cannot be conclusively explained, some explanation can be proffered. Since the major difference between these two studies was their

referral source, it is likely that the differences were due to sample differences; therefore these results indicate that clinically identified children with DCD are different from teacher results indicate that clinically identified children with DCD are different from teacher-identified children. This has a number of implications, *e.g.*, it suggests that findings with respect to one sample may not be applicable to the other. Evidence from other studies (Polatajko *et al.* 1992), has led to similar conclusions, suggesting that a careful re-examination of the literature on children with motor problems and of the differences among these children is warranted.

These results further suggest that increased kinaesthetic acuity does not immediately translate into increased motor performance in children with DCD, nor would it appear that these children spontaneously apply and generalize new-found skills. Both these points merit further investigation.

While the primary purpose of this study was to investigate the POR_X approach, this study also provides evidence of the severity of the 'mild' motor problems of the children referred to occupational therapy for assessment, and hence their need for intervention. The data from the no-treatment group suggest that these children did not change spontaneously, *i.e.* there was no time effect in this study, while the data from the traditional group suggest that the motor problems of these children are very resistant to treatment, at least in the short term. Indeed, these results suggest that all of the current treatment approaches warrant careful examination if they are to be continued to be used with children with DCD. Finally, the data may provide some suggestions as to what an appropriate

treatment strategy might be. Where there was direct, repetitive training of a specific skill, the treatment had a clear and strong effect. Perhaps a more direct approach to treatment than is typical in most motor programmes for these children should be considered.

The results reported here must be interpreted with caution, particularly because the analyses largely failed to reject the null hypothesis. The ultimate aim of this study was to identify a treatment approach that would decrease the motor impairment of children with DCD. Such an approach would serve to minimize the impact of the disability, prevent the emergence of the secondary emotional and social problems that Gubbay (1978), Henderson and Hall (1982), Roth-Smith (1983) and Laszlo and Baird (1985b) have described and finally enable these children to achieve their health potential.

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Authors' Appointments

*Helene J. Polatajko, PhD, OT(C);
Jennifer J. Macnab, BA;
Samuel Noh, PhD (Epi);
Department of Occupational Therapy, University of Western Ontario, Elborn College, London, Ontario N6G 1H1, Canada.
Bev Anstett, BSc (OT), Huron County Homecare Program, Ontario.
Kathleen Murphy, BSc (OT), Department of Occupational Therapy, Child and Parent Resource Institute (CPRI), London, Ontario.
Theresa Malloy-Miller, MSc, OT(C), Community Resource Program, Thames Valley Children's Centre, London, Ontario.

**Correspondence to first author.*

SUMMARY

The process-oriented treatment (POR_X) approach is a time-limited programme aimed at increasing the kinaesthetic performance of children with mild motor problems in order to improve their motor performance. The approach was compared with a traditional or general motor approach and with no treatment in a randomized clinical trial of 75 children with developmental co-ordination disorder. The children were assessed before and after treatment and after a six-week follow-up period. The results were mixed. The study provides evidence of the severity of so-called 'mild' motor problems of children referred to occupational therapy. The data suggest that these children do not improve spontaneously, and that their motor problems are very resistant to treatment. The data also suggest that an appropriate treatment strategy might be one that involves direct, repetitive training of a specific skill.

RÉSUMÉ

Essai clinique d'une approche par procédé de traitement orienté chez les enfants avec trouble développemental de la coordination.

L'approche par procédé de traitement orienté (POR_X) est un programme limité dans le temps visant à accroître les performances kinesthésiques d'enfants présentant des problèmes moteurs modérés pour améliorer les performances motrices. Cette approche a été comparée à une approche traditionnelle ou globale de rééducation motrice, et avec une absence de traitement dans un essai clinique distribué au hasard, chez 75 enfants présentant un trouble de coordination. Une évaluation des enfants fut faite avant et après traitement, et après un suivi de six semaines. Les résultats furent mitigés. L'étude démontre la gravité des problèmes moteurs des enfants adressés en ergothérapie, appelés à tort légers. Les données suggèrent que ces enfants ne progressent pas spontanément et que leurs problèmes moteurs résistent au traitement. Les données suggèrent également qu'une stratégie thérapeutique appropriée pourrait être celle qui implique un apprentissage direct, répétitif d'une tâche spécifique.

ZUSAMMENFASSUNG

Ein klinischer Versuch eines Prozeß-orientierten-Behandlungsansatzes bei Kindern mit Koordinationsstörungen

Der Versuch einer Prozeß-orientierten-Behandlung (POR_X) ist ein zeitlich begrenztes Programm mit dem Ziel die kinaesthetischen Fähigkeiten bei Kindern mit leichten motorischen Problemen zu steigern und dadurch ihre motorischen Fähigkeiten zu verbessern. Dieser Ansatz wurde in einer randomisierten klinischen Studie an 75 Kindern mit Koordinationsstörungen mit einer traditionellen oder allgemeinen motorischen Therapie, sowie ohne Behandlung verglichen. Die Kinder wurden vor und nach der Therapie und nach weiteren sechs Wochen untersucht. Die Ergebnisse waren gemischt. Durch die Studie wird der Schweregrad der sogenannten 'leichten' motorischen Störungen bei Kindern deutlich, denen Beschäftigungstherapie verordnet wurde. Die Daten zeigen, daß sich diese Kinder nicht spontan bessern und daß ihre motorischen Probleme sehr Therapie-resistent sind. Außerdem lassen die Daten erkennen, daß die richtige Therapiestrategie in einem direkten, repetitiven Training spezifischer Fähigkeiten bestehen könnte.

RESUMEN

Ensayo clínico de la aproximación del tratamiento orientado al proceso en niños con alteración del desarrollo de la coordinación

La aproximación del tratamiento orientado al proceso (TOP) es un programa con tiempo limitado, que apunta a aumentar la realización cinestésica en niños con problemas motores moderados, con el objeto de mejorar su realización motora. La aproximación se comparó con una aproximación motora general y con una ausencia de tratamiento, en un ensayo clínico randomizado en 75 niños con alteración en el desarrollo de la coordinación. Los niños fueron evaluados antes y después de un periodo de seguimiento de seis semanas. Los resultados fueron mezclados. El estudio proporcionó evidencia de la gravedad de los problemas llamados 'moderados' en niños transferidos a terapia ocupacional. Los datos sugieren que estos niños no mejoran espontáneamente y que sus problemas motores son muy resistentes al tratamiento. Los datos también sugieren que una estrategia terapéutica apropiada sería la que afectara directamente un aprendizaje directo y repetitivo de una habilidad específica.

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