Still jumping on the balance beam: continued use of perceptual motor programs in Australian schools

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Perceptual motor programs (PMPs) are used widely in Australian schools. This study reports on an analysis of the information about the uses and the rationales for these programs drawn from the websites of Australian schools. Wide-ranging claims are made for the benefits of these programs for students with difficulties and for typically developing students but there is evidence that they are not effective in improving academic and other skills. Although the survey is limited to 117 schools with websites that mention PMPs, the uncritical acceptance of these programs by schools and teachers is of concern. Calls are made for professional bodies, teacher training institutions and government departments concerned with education to disseminate clear guidelines on effective interventions to schools and teachers.

Perceptual motor programs

Perceptual motor programs (PMPs) that engage students in a variety of physical activities and exercises aimed at improving perception and gross and fine motor skills continue to be employed in Australian schools. At a time when teachers complain of the crowded curriculum and are expected to provide for the educational needs of an increasingly diverse population, easy-to-implement programs which claim to meet the needs of all students are likely to be attractive. The use of PMPs with typically developing students as well as students with academic difficulties is justified by claims that these programs will promote academic learning, particularly in literacy. There are a number of commercial programs and operations publicised in Australia through books and websites (see, for example, Brain Gym, 2006a; Children's Connection Ltd, 2005; Move to Learn, n.d.a.; Pheloung, 1997; Smart Starters, 2002a).

PMPs have a long history in special education. Perceptual processes are those involved in the detection and interpretation of sensory stimuli, while motor processes are those that are involved in movement. Perceptual motor processes are those believed to coordinate perceptual and motor skills (Cole & Chan, 1990). PMPs are predicated on the belief that perceptual and motor experiences

underpin early learning and that children who have underdeveloped perceptual motor processing will have difficulty learning basic academic skills. The programs are thus designed to train these underlying processes in the belief that this will facilitate academic learning. This is one example of the approach to special education that attempts to diagnose the underlying processing problems, then to provide an intervention which will remediate those processes and result in widespread improvements in functions thought to be based on those basic processes (Cole & Chan, 1990). While recent research in the areas of genetics and neuroimaging does suggest a biological basis for learning disabilities (Lloyd & Hallahan, 2005), it is systematic instruction in skills such as decoding in literacy and cognitive strategy instruction that have empirical support, not programs involving perceptual motor training.

There is certainly some evidence to suggest that children with motor difficulties are more at risk of difficulties in reading, writing and spelling than children without such difficulties (Dewey, Kaplan, Crawford, & Wilson, 2002). Visser, however, notes that reading difficulty has been 'related to problems with almost any sensory or motor skill imaginable' (2003, p. 480). Around half the children identified as having Attention Deficit Hyperactivity Disorder (ADHD) or learning difficulties may also be regarded as having Developmental Coordination Disorder (Barnhart, Davenport, Epps, & Nordquist, 2003). Developmental Coordination Disorder (DCD) is defined by the *Diagnostic and Statistical Manual of Mental Disorders* as 'a marked impairment in the development of motor coordination' (American Psychiatric Association, 1994, p. 53). The impairment must affect other areas of life and must not be due to neurological problems or a developmental disorder. Children with these difficulties have also been referred to as clumsy, as motorically awkward and as having perceptual motor difficulties (Barnhart et al., 2003). These children are also likely to have problems with attention and with psychosocial adjustment (Dewey et al., 2002).

DCD is somewhat problematic as there is no agreed way of assessing motor difficulties and no agreed criteria for the disorder; the same child may be identified by some assessment tools and not by others. Salvia and Ysseldyke (2004) in their text on assessment have noted that tests available for perceptual motor development are theoretically and psychometrically flawed and that there is a danger in using them in intervention planning.

Advocates of perceptual motor programs espouse theories that are not widely accepted as explanations of reading and academic difficulty. Many programs, for example, include movements that are claimed to integrate the two sides of the brain and the body, and facilitate movements that cross the midline. This ability is claimed to be important for reading (Brain Gym, 2006b; Move To Learn, n.d.b.; Pheloung, 1997). It appears, however, that PMPs may not be able to influence the ability to cross the midline. Maskell, Shapiro and Ridley (2004) measured the ability to coordinate motor movement across the midline directly by looking at children's ability to throw a ball overhand at a target. They found that the addition of Brain Gym movements to a regular physical education program had no impact on this ability.

Kavale and Mattson (1983) reported on a meta-analysis of perceptual motor programs which showed that overall they had a near zero effect (effect size of .082) and that the effect on academic achievement was also negligible. Surprisingly, even the effect on perceptual motor skills was also modest. They noted that evidence for the efficacy of these programs depended on narrative reviews and case study reports, and that their analysis of the existing experimental studies led them to conclude that perceptual motor interventions were not effective. Hammill (2004), in an extensive review of abilities related to reading, found that the correlation between perceptual motor skills and reading abilities was small (0.17) and that training in perceptual motor skills would have no benefit for reading. Hyatt (in press), in a very recent review of the published research on the effects of Brain Gym, concluded that none of the four studies reviewed was sound and none provided sound evidence for positive effects from this program.

In a position paper released in 1986, the Council for Learning Disabilities in the United States categorically opposed the use of perceptual motor programs as components of services for students with learning disabilities. They criticised the assessment strategies employed and stated that there was little or no evidence that such programs improved either perceptual motor skills or academic performance. Their advice to schools was to 'view the time, money and other resources devoted to such activities as wasteful, as an obstruction to the provision of appropriate services' (Council for Learning Disabilities, 1987).

Kavale and Mattson commented, somewhat presciently as it happened, that 'deep historical roots and strong clinical tradition will make it difficult to remove perceptual motor training from its prominent position as a treatment technique for exceptional children' (1983, p. 172). Kavale and Forness (2000) in a discussion of the impact of meta-analysis on policy in special education subsequently noted seventeen years later, that policy about PMPs remained contentious despite the weak effect sizes demonstrated in meta-analysis. Kavale and Forness attributed the ongoing appeal of perceptual motor programs to 'seductive clinical reports, intuitive appeal, and deep historical roots' (2000, p. 298) that overshadow the negative findings from the research. Kavale (2001) stated that perceptual motor programs linger on and have 'intuitive appeal' despite being regularly debunked.

Visser (2003) suggested that there are three groups of theories about DCD. The first is the 'atypical brain development' hypothesis, reminiscent of 'minimal brain damage', which posits that there are diffuse abnormalities with different patterns underlying different child characteristics (DCD, ADHD, reading difficulties, language impairment). The second is that there are children with deficits in attention, motor control and perceptual disorders as a result of some generalised underlying dysfunction. The third is the automatisation deficit hypothesis, which ascribes motor difficulties and difficulties with reading and attention to defects in the cerebellum that make it difficult for these children to coordinate motor and non-motor tasks. The coordination is difficult because the children have not fully automatised tasks; so, for example, they cannot balance on a beam and perform some other task such as counting backwards. While this represents interesting

theoretical speculation, the fundamental question for teachers is whether these theoretical analyses of causal factors generate effective interventions to improve educational outcomes.

A recent Australian project (Rohl, Milton, & Brady, 2000), carried out for the Commonwealth government on provisions for students with learning difficulties, gives a snapshot of intervention practices for students with difficulty in literacy and numeracy. As part of this project, surveys completed by a sample of 377 schools across Australia provided information about practices implemented to assist students with difficulties in literacy and numeracy. Across the country, thirty per cent of schools reported the use of perceptual motor programs. The distribution of use varied from state to state with only eight per cent of schools in New South Wales reporting use and more than thirty per cent of schools in Western Australia, Victoria and Queensland reporting such use.

Some education authorities appear to be unaware of the lack of evidence for the efficacy of PMPs. Three recent examples include awards by Queensland and NSW education authorities and an article in the online journal *Curriculum Leadership*, produced by the Curriculum Corporation Board, which includes representatives of all state education departments. In 2004, Queensland state, independent and Catholic education authorities, in association with the Commonwealth government, made awards for initiatives in literacy and numeracy to three schools for their use of PMPs to improve literacy learning. In support of these awards, claims were made that these programs result in 'improved learning outcomes in literacy and spin-offs to other areas of the curriculum' (Coordinating Committee, National Literacy and Numeracy Week, 2005, p. 11). In NSW a Premier's Scholarship was given to a teacher who investigated movement programs in Scotland (including Brain Gym) and recommended that movement programs be developed for students with learning and/or behavioural difficulties (Grant, 2006). The journal *Curriculum Leadership* claims to publish articles of value to educators from authoritative sources and authors (Curriculum Corporation, n.d.); the journal published an article (Batenburg, 2005) describing a literacy program, funded by the Commonwealth Disadvantaged Schools project, that incorporated a perceptual motor component with specific activities for specific delays. This program has also received a National Literacy and Numeracy award.

Given the figures on the use of PMPs from earlier Australian research, and the more recent endorsements, this study set out to explore the use of PMPs in Australian schools and to determine the rationales and beliefs that schools provide for the implementation of perceptual motor programs.

Method

A Google search for the terms 'perceptual motor' AND program OR training, limited to Australian sites, resulted in about 15,000 hits. We examined the first 300 of these hits to identify sites that contained information provided by schools about their perceptual motor programs. The information relevant to PMPs was printed out. This search resulted in information from 117 schools. The sample comprised one school from NSW, two each from the Australian Capital Territory and

Table 1 Criteria for classifying school rationales for PMPs

Classification	*Criteria*
Mention only	Site mentions that the school has a PMP only, does not provide any additional information.
Supports students with special needs	Site specifically says that the programs are for students experiencing difficulty or for students with disabilities.
Improves academic performance	Site specifically claims that academic performance, cognitive skills, language, concepts, memory, concentration and/or reasoning will be improved through participation in a PMP.
Improves social skills	Site specifically claims that social skills, cooperation and/or other skills related to group work will be improved.
Improves self esteem	Site specifically claims that self esteem, body image and/or self perception will be improved by participation in a PMP.
Improves perceptual motor skills	Site specifically claims that fine motor, gross motor or perceptual skills will be improved by a PMP.
Volunteer participation	Site mentions that the school uses parent or community volunteers to help run the PMP.

Tasmania, four each from Western Australia and Northern Territory, fifteen from Queensland and eighty-nine from Victoria. The sample comprised seventy-six state schools, twenty-five Catholic schools and sixteen independent schools.

The first author read all of the material and developed a set of criteria for classifying the rationales and beliefs. The categories developed are set out in Table 1.

The first author then classified the information from each site according to these criteria. To establish the reliability of the classification, a second rater was provided with the printouts from the sites and the classification criteria and also independently classified each site according to the criteria. Inter-rater reliability was calculated using the agreements/(agreements + disagreements) formula and was found to be ninety-six per cent. Where there were disagreements about the classifications, the second author was provided with the relevant information and made the final decision on classification using the same criteria.

As well as classifying the rationales, the authors collected and summarised other information from the pages, including type of school, state where school is located, ages/grades/classes of students involved in the PMPs, and position of PMPs in the overall school program.

Results

Place of PMPs in school programs

Typically, PMP programs were provided for students in the early years of school. Of the sixty-six schools that provided details of target groups, only three schools, or five per cent, specifically mentioned students above Grade Two and forty-two schools, or sixty-four per cent, indicated that the program was for Prep, Grade One and/or Grade Two.

The programs were mentioned as part of the Physical Education, Health or Sport programs for thirty-eight schools, or thirty-two per cent, of the 117 schools; as a special feature, separate program or as an additional activity providing support or enrichment for forty-eight schools, or forty-one per cent; as part of the curriculum for seven schools, or six per cent; and twenty-four schools did not provide information about how the program was situated or seen within the school.

Rationales for PMPs

The number of schools that included information that allowed a classification of the rational or purported benefits and outcomes and that fell into each of the categories is summarised in Table 2. Of the 117 sites, fifty-six schools, or forty-eight per cent of the sample, mentioned that they ran a PMP but did not provide a rationale or description of purported outcomes.

Of the thirty-three schools that mentioned volunteer participation, there were eleven schools where this was the only additional information provided about the program. We classified these cases as not providing a rationale or description of purported outcomes.

Fifty schools, or forty-three per cent of the sample, provided information on a rationale for the use of PMPs. Several schools provided several points in their rationales.

Table 2 School rationales for PMPs

Classification	*Number of schools listing rationale*
Mention only	56
Supports students with special needs	6
Improves academic performance	29
Improves social skills	9
Improves self esteem	20
Improves perceptual motor skills	40
Volunteer participation	33

PMPs and students with special education needs

Schools using PMPs with students with special needs were utilising them for students with perceptual motor difficulties in the early years of school, 'those who needed them', students in special education units, students with deficits in sensory motor skills, students with difficulties in the classroom and for students with disabilities.

Rationales and claimed benefits of the program were examined for schools that provided that information. Nearly half the schools that provided additional information about PMPs made broad claims about their effects on academic skills. PMPs were reported, for example, to 'enhance brain development by stimulating the five senses through movement'; to aid 'concentration and reasoning' to 'develop . . . memory skills'; to 'promote . . . auditory and visual memory'; and to provide the 'requisite skills needed for formal learning.'

PMPs and formal learning

Many websites claimed that these broad purported effects provided a base for formal learning in general or for literacy and/or numeracy skills in particular: for example, sites claimed that PMPs 'assist with the development of fine motor skills, essential in the learning of reading and writing'; 'concentrate heavily on the development of perceptions and language which enhances a child's ability to cope with his/her classroom work'; 'assist in the development of reading'; develop 'vocabulary, reading, music and mathematical processes'; develop skills that 'transfer into the classroom to assist with reading and writing'; complement 'the development of literacy and numeracy skills'; and develop 'concept awareness'.

PMPs and social skills

In addition to the claims about academic benefits, nine schools made claims about the effect of PMPs on social skills with an emphasis on peer relationships and cooperation, such as, a PMP 'assists the development of the child and their relationship with their peers' and 'encourages cooperation.' The claims by nearly one third of schools about the effect of PMPS on self-esteem tended to focus on developing a good body image as well as self-esteem 'through success at an individual level' and self-confidence.

PMPs and perceptual motor skills

Of the thirty-eight schools that located their PMPs within Physical Education, Sport or Health curricula, only thirteen limited their claims to improvement in perceptual motor skills. Schools claimed that their programs could improve a range of perceptual motor skills, such as perceptual awareness, body strength, spatial knowledge, physical coordination, body perception, fine and gross motor skills, hand-eye and foot-eye coordination, perceptual judgements, balance, locomotor skills, the development of laterality, body rhythm and ball skills. Few schools provided details of the actual activities; those that did listed exercises such as balance activities, ball activities, eye tracking exercises, fine motor activities, gymnastics, movement and language experiences, and the use of equipment such as hoops, balance beams, bean bags, swinging and climbing ropes, trampetes and climbing apparatus.

Resources employed in PMPs

Some schools appeared to devote considerable resources and time to their programs. Schools reported having purchased dedicated equipment or had set up a specialised PMP room. Of the eleven schools that provided information about timetabling of the program, four ran the program once a week, four twice a week, two three times a week and one once or twice a week. This represents a substantial use of time in some schools.

Amongst the schools that described the organisation of their programs, the use of small groups and volunteers were common, and three schools noted the need for parent volunteers to be trained.

Use of commercial PMPs

The actual programs being used were not often named. One school said its program was 'a natural flow-on to the preschool Gymbaroo program' and another said its program was 'based loosely on Gymbaroo principles'. Another described its program as 'a unique Australian program developed by Australians for Australian children'. This program is likely to have been the Smart Starters program, as this is described on the website (Smart Starters, 2002b) as 'a unique Australian program'. The Smart Starters program written by Judie Bulluss and Peter Cole, the Jack Capon Perceptual Motor Program and the Brain Gym program were specifically mentioned on school websites. The Jack Capon materials are marketed in Australia through the Gymbaroo website (Toddler Kindy Gymbaroo, n.d.a).

Detailed rationales for PMPs

Twelve schools specifically linked their PMPs to language development: for example, 'language development is an integral part of the program'; the program 'concentrates heavily on . . . language'; and the program 'develops . . . vocabulary'. The school using the Bulluss and Cole program (2002b) emphasised the use of language during the activities and the importance of follow up on language in the classroom, stating that 'language is the key factor in providing perceptual knowledge about motor experience.'

Four schools provided more detailed rationales. One school explained that a motor base is essential for higher levels of learning such as concept formation and thus proficiency in the PMP precedes writing and reading. It quoted Margaret Sasse—founder of A New Start for the Under Achiever, an organisation that aimed to help students who were having difficulty at school, and founder of PMP Gymbaroo—who claimed that learning difficulties often originate when children miss developmental stages such as crawling. This school claimed that 'many children are unable to sort through incoming sensory information and respond with an appropriate muscle or motor movement'. For those children who are able to do this, the program would 'reinforce such development.' This school also claimed the programs would help overactive children become calm and reduce frustration. The relaxation induced by PMPs is important because 'information travels through the system more efficiently and completely when muscles are relaxed'.

One school had a policy statement about their PMP that described the aim of the program: 'to teach the child perceptions and understandings of them self (sic) and their world through movement/motor experiences. This in turn will be used to teach perceptions of time and space, the pattern and order of the natural world, the laws and limitations that govern the human body. From this will grow the ability to manipulate the above to suit the child's own best interest.' It was claimed that the program provided the prerequisite skills 'needed for formal learning in reading, writing, word study and mathematics.' The school that included Brain Gym in its PMP described the program's owner Paul Dennison as 'a pioneer of brain research' and provided the broad justification that his research had demonstrated the interdependence of physical development, language acquisition and academic achievement.

The special school that implemented PMPs claimed that the nervous system needed to be trained so movement tasks could become automatic and thus allow students to do more than one task at a time. This school claimed that developing laterality is important to reading as the 'eyes must also learn to track across the midline to avoid potential difficulties with reading.' It claimed that balance is important because insufficient stimulation of the vestibular system can 'lead to reduced muscle tone, which in turn decreases body awareness.'

Summary

Our results confirm the findings that PMPs are still being used as part of remediation programs for students with difficulties in literacy and numeracy in Australian schools. It is also of concern that the programs are being widely used with typically developing children with the expectation that there will be an impact on academic learning, cognitive skills and social development. These broad ambit claims are made with no reference to any research to support them and simply echo the claims made by those advocating such programs.

Discussion

The results indicate that PMPs are still being used in Australian schools. It appears from this study that they are much more widely used in Victoria than other states. Repeating the search with the addition of state names as a search term confirmed that many more Victorian schools appeared in the results than schools in other states. It is not clear why this should be so. A search of the website of the Victorian Department of Education and Training did not locate any information on PMPs. In response to a query, a representative of the department indicated that the only relevant material was a motor skills program provided to schools as part of the resources for physical education (R. C. Allsop, personal communication, March 23, 2006). Smart Starters and Gymbaroo, two of the programs mentioned by schools, are based in Victoria and Smart Starters offers professional development to teachers.

Although this research is limited in that it reports information only from those schools that have established a website, and in that often only limited information was available on those sites, it confirms the use of PMPs within schools across Australia. A much broader survey of the use of PMPs in a representative sample of schools would be needed in order to clarify the extent of the use of these programs across the country. Any level of use in schools is of concern as the general claims that PMPs will benefit cognitive, sensory or motor development for all children are unsustainable, and it is of additional concern that the claims about the benefits of PMPs, which remain unproven for students with special education needs, have been extended to the typical population. Skills and abilities related to these areas develop in all typical children around the same age despite environmental influences. They do not depend on any specific experiences and typically developing children will receive adequate experiences in normal environments. These skills and abilities may underpin academic learning but at this point 'we have no idea, certainly no idea based on neuro-scientific research, how the emergence of these capacities relates to later school learning' (Bruer, 1997, p. 7).

Although many schools located their PMPs in the area of Physical Education and Health, the use of the programs in this way has also been questioned. Campbell (1997) noted that PMPs have not been shown to be more effective than regular Physical Education programs and they include features that suggest that they may be less effective in promoting physical activity and skill development. She suggested that the practice of rotating groups of children through stations may result in a lot of time spent waiting, and little time spent in physical activity. The use of volunteers means that students may not receive effective instruction, feedback and assessment on foundation motor skills.

There are many interventions in education that inhabit the murky borderlands between unproven and disproved. The strikingly consistent accumulated evidence of failure of PMPs, as a class of interventions, places them firmly at the unproven end of this continuum. Given this evidence and the speculative, unproven and often simplistic nature of their theoretical rationales, there is a compelling case to regard them with far more caution than many other interventions. The possibility that an effective PMP may one day be developed cannot be ruled out. Given their history, however, there would appear to be no case for using valuable educational resources to implement any PMP in schools without extraordinarily good and replicated evidence for efficacy. Given this, the apparently broad and ambit claims made by schools using PMPs must be of concern.

Presumably schools and teachers use these programs, at least in part, because they believe the claims made for them. As the programs are marketed on the internet and through books, promotional material about them is relatively accessible. The claims made on program websites may not refer to any research at all (see, for example, Smart Starters, 2002a; Toddler Kindy Gymbaroo, n.d.b) or refer only to poorly-conceived in-house research that has not been peer reviewed or published in journals (see for example, Brain Gym, 2006a; Children's Connection Ltd, 2005b; Move to Learn, n.d.c.; Pheloung, 1997). Although some of these sites are primarily directed at students with learning difficulties, others make claims about the effects of PMPs on typically developing people (Brain Gym, 2006a; Children's Connection Ltd, 2005b; Smart Starters, 2002a). Corrie and Barratt-Pugh (1997) noted that the Bulluss and Cole programs marketed by Smart Starters were widely used in Western Australia and were promoted as beneficial for all children. Teachers appear to accept the claims at face value and appear not to be motivated or able to research further for evidence about the efficacy of the programs. The reason for the use of these programs is an area to be researched through more direct and detailed exploration with schools and teachers. It would be hoped that with increasing calls for evidence-based practices in education that consumers of these programs may become more critical.

It is particularly disappointing that PMPs are still being advocated as aids to instruction in reading and related skills. Over the past thirty years or so, scientists who study reading have made enormous progress in our understanding of how children learn to read and how we should teach them so that they learn quickly and easily. In 2000, the National Reading Panel in the United States issued an influential report reviewing the research evidence on how reading works and how it

should best be taught (National Institute of Child Health and Human Development, 2000; summarised by de Lemos, 2002). The Nelson report of the Australian National Inquiry into Teaching Literacy was released in December 2005 (Department of Education, Science and Training, 2005) while the British Rose Report (Rose, 2006) was released in March, 2006. An international consensus is clearly emerging, reflected in all three reports, that the initial teaching of reading could be greatly improved by being directly informed by the available scientific evidence on what makes for effective reading instruction. Both the American and the Australian reports argue that in order to be able to read, children need to learn or receive specific instruction in five major areas: phonemic awareness, phonics, fluency, vocabulary, and comprehension. The British report further emphasises the importance of systematic, intensive *synthetic* phonics instruction. Most importantly, not one of these highly influential reports makes any suggestion that perceptual motor programs have any role to play in reading instruction.

Although it seems unlikely that PMPs will do any harm, and are probably enjoyed by children, teachers and volunteers, their impact is not neutral. They take time, materials and resources away from programs that are likely to be effective (Corrie & Barratt-Pugh, 1997), and this is of special concern for students with academic difficulties. PMPs are not an appropriate intervention choice for these students. The responsibility for intervention selection cannot lie solely with individual teachers and schools. Even in areas that have a strong tradition of evidence-based practice, like medicine, it is probably not reasonable to expect individual general practitioners to have the time or skill to synthesise and evaluate large bodies of research across diverse areas. Paralleling practice in medicine, universities, professional organisations and governmental departments of education should play an important and active role in filtering and synthesising research information, and regularly revising and refining recommendations to teachers, based on accumulated research evidence. If the preponderance of PMPs in schools in Australia is an example, these organisations, as a whole, appear to have failed in synthesising the research and communicating the results to teachers.

Kavale and Mattson (1983) published a classic review examining PMPs, wryly titled ' "One jumped off the balance beam": Meta-analysis of perceptual-motor training.' They may have hoped that this clear demonstration of the ineffectiveness of this class of program would have assisted in the recognition that PMPs represent a futile exercise in education. Unfortunately, more than two decades on, and in the absence of any substantive supporting evidence, it appears that many children in Australian schools continue to jump on the balance beam.

Keywords

academic achievement	mainstreaming	perceptual motor learning
primary schools	special needs students	teaching effectiveness

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