THE EFFECT OF A PERCEPTUAL MOTOR PROGRAMME ON THE DRAWING OF A PERSON BY FIVE YEAR OLD NEW ZEALAND CHILDREN.

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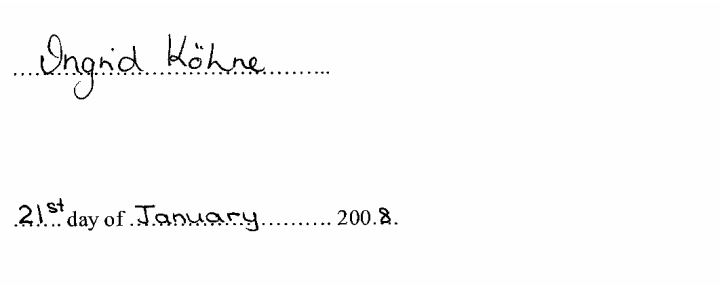
A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science in Occupational Therapy.

New Zealand, 2008.

Ethical Clearance Number: M040937.

DECLARATION

I, Ingrid Catherine Köhne declare that this research report is my own work. It is being submitted in partial fulfilment of the requirements for the degree of Master of Science in Occupational Therapy in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.



21st day of January 2008.

ABSTRACT

This study investigated whether participation in the Smart Start with Perceptual Motor Program (PMP) over a six month period, by a group of 14 five year old New Zealand school children from a low socio-economic school in Rotorua, enhanced their drawings of a man, woman and self when compared to a control group of 14 children who did not participate in PMP. Their drawings were scored using the Draw A Person: A Quantitative Scoring System (DAP) by Naglieri. The data from this quasi-experimental research design was analysed using an analysis of covariance to compare the two groups. Scores of the drawing of Self were analysed separately from the Total scores (sum of the Man, Woman and Self scores). There was not a significant difference between the experimental and the control group. A number of confounding variables, including small sample size, number of PMP sessions and differences between groups, were likely to have influenced the results.

ACKNOWLEDGEMENTS

The researcher would like to gratefully acknowledge the assistance received from the following people:

Adj. Prof. Pat de Witt	- Supervisor, University of the Witwatersrand, SA
Prof. Piet Becker	- Statistician, South African Medical Research Council
Dr Brian Coffee	- Director of Research, Bay of Plenty Polytechnic, NZ
Dr Ruth Gorinski	- Researcher, Bay of Plenty Polytechnic, NZ
Jean O'Boyle	- Librarian, Rotorua Hospital, NZ
Helen Richards	- Librarian, Gisborne Hospital, NZ
Patricia Laurenson	- Information Co-ordinator, M. of Education Library, NZ

The researcher also acknowledges and thanks the principals, staff, parents and children from the two schools in Rotorua who participated in this study.

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CHAPTER 1

1.0 INTRODUCTION

1.1 Introductory Statement

This study examined the effect of a specific perceptual motor programme on human figure drawings by five year old New Zealand children from the central North Island town of Rotorua. This specific perceptual motor programme is called Smart Start with Perceptual Motor Program (PMP) developed by Judie Bulluss and Peter Coles. The investigation of PMP is important as it has been developed

> *'to cater for today's students in a changing environment'* where *'less opportunity is provided for children to play, climb, run, challenge and gain motor experiences.'* [1, p1]

An essential outcome of children's participation in PMP is the enhancement of their body image. [2] According to literature, young children's body image can be inferred from their human figure drawings. [3, 4, 5] Studies have shown that movement experiences can significantly increase the quantitative aspects of children's drawings of people. [4, 6, 7] It is possible therefore that participation in PMP will cause similar effects and this will be reflected in the drawings of a man, woman and self by five year old New Zealand children.

1.2 Justification of the Study

Perceptual motor based techniques and programmes have been utilised in the fields of occupational therapy and education since the 1960's. [8]

> *'The importance of perceptual motor function in early learning, in maturation of motor competence, and in personality development has made it a subject of primary consideration in developmental occupational therapy.'* [9, p423]

Occupational therapists have researched various aspects of perceptual motor programmes including the effects on: gross motor skills; [3, 9, 10] fine motor skills and visual-motor integration; [3, 10] visual perceptual skills; [3] self-concept; [9] and body image. [3] As body image involves the awareness of the various parts of the body and their relationship to each other, [2] it is essential for the performance of activities of daily living. Tasks such as feeding, dressing, using a pencil and catching a ball, all rely on the accurate knowledge of one's body. [6] Body image must therefore be considered by occupational therapists when assessing and treating children with perceptual motor deficits. [6] The effects of perceptual motor training on body image have been measured by children's performance on draw a person tests. Occupational therapists have also studied the effects of sensorimotor and cognitive-perceptual training on young children's human figure drawings. [6]

Within the area of children's human figure drawing, a number of draw a person tests have been devised and utilised. Each draw a person test has different scoring criteria and interpretations depending on the purpose and field of study.[11] In occupational therapy studies, the Goodenough-Harris Draw-a-Person Test and the Miller Draw-a-Person Game have been used to assess young children's body concept [6] and body image. [3] The effect of movement on body image and concept has been measured by the number, details and proportion of body parts within their human figure drawings. The Goodenough Draw-a-Man Test has been validated as a test of personal neglect in stroke patients. [12]

The Goodenough-Harris Draw-a-Person Test and its predecessor, the Goodenough Draw-a-Man Test, have also been utilised in the field of special and movement education as scoring

measures for children's human figure drawings. This has included studies evaluating the effect of movement interventions. [7, 13, 14]

In the PMP training workshop, [15] the Goodenough Draw-a-Man Test is provided to score children's drawings of themselves. The drawing task can be re-administered once the children have participated in PMP for a time. The drawings of self are scored on various criteria with emphasis on the presence of body parts. [16] Bulluss and Coles write that the

> *'children's drawings of themselves will give the teacher some idea of how much internalised knowledge the child has of their own body. The child will draw the parts they know they have.'* [2 p16]

The children's self drawings are interpreted as an indication of their body image. Body image

> *'is the complete cognizance of one's own body and its movement possibilities. It is the internal knowledge of the "me-ness of me".'* [2 p16]

According to Bulluss and Coles, many activities in PMP aim to improve children's body image. These activities include the use of dramatised songs emphasising body parts, musical games and movement activities where specific body parts are used in controlled ways e.g. climbing ladders and ropes with hands and feet. The improvement of children's body image is an essential outcome of their participation in PMP. [2]

The improvement of children's body image is an important outcome not only in PMP but also in perceptual motor programmes [3, 17] and sensorimotor interventions in general. [18, 19] It is necessary for children to be fully aware of their bodies in order to learn to move skilfully and

interact successfully within their environment. [19, 20, 21] Developmental studies on the way in which young children understand and use their bodies recognise the importance of providing movement opportunities to enhance their body image. [22, 23]

In addition, the acquisition of information about children's developing body image is important as there is limited data available on the developmental progression at which most children are aware of their various body parts. [21, 24] Research on the initial development of body image in children suggests that young children possess a vague conception of their body structure. [25] Body image also forms a part of the concept of self which is essential for optimal health and well-being. [2, 21]

Body image is a complex construct [26] and as a result is difficult to measure. [4] The human figure drawing task however, offers advantages when working with young children. [25] Young children's freehand human figure drawings provide a valuable measure of their conceptual knowledge of their body. [6, 23] Numerous studies [13, 16, 27] have validated the increase in parts, details and accuracy of proportions in human figure drawings by children with increase in chronological age. Young children in particular, tend to draw what they know. [28] Experts in the field of study of children's drawings view their drawings as public representations of their internal thoughts and mental processes. [29]

PMP is currently being used in schools in many countries including New Zealand, Australia, [30, 31] Scotland, Oman, Hong Kong, Singapore and India. [32] In New Zealand, PMP has become more popular in schools over the last five to eight years. As yet the New Zealand Ministry of Education does not fund the programme so PMP is funded on the schools'

initiatives. [33] If the Ministry of Education were to fund PMP many more schools would be able to offer the programme. Before such funding could be considered the effectiveness of PMP as a perceptual motor and early learning intervention would need to be established. [31]

1.3 Statement of the Problem

There is limited literature examining the efficacy of perceptual motor programmes in general within the typically developing four to five year old population. [21] Available literature with young children indicates that self-concept [9] and body image [3, 6] can be improved by perceptual motor training. Although various methods have been utilised to measure body image in children, [3, 5] the detection of body image problems in young children is complex. [4] Researchers [19] have suggested that studies should specifically examine methods for assessing the body image component of perceptual motor programmes.

Despite the growing popularity of PMP, there is to date no published research on the effectiveness of any aspect of this programme, including body image as a perception of self. [1] Bulluss and Coles provide [15] the non-standardised Goodenough Draw-a-Man Test [16] to evaluate the children's drawings of themselves as a measure of their body image. [2] The reported changes in children's human figure drawings could be due to maturation or spontaneous learning factors.

The evidence that Bulluss and Coles have used to substantiate the value of PMP is the fact that it has been used for about 28 years. This is despite the cost in time, equipment and resources that schools need to allocate to the implementation of PMP. [1] Informal reports regarding the effectiveness of the programme include, observed improvements in motor performance in the

areas of skipping, ball handling abilities, seated posture and handwriting. Memory development, general enjoyment and improvements in attitudes of the children who took part in PMP, have been observed. [33] Teachers have also commented on improvements in children's drawing of self and knowledge of their bodies. [34]

1.4 Purpose of the Study

The purpose of this study was to examine the effectiveness of Smart Start with Perceptual Motor Program (PMP) on enhancing the ability of five year old New Zealand children to draw pictures of a person - a man, woman and themselves. This study investigated whether there would be a significant quantitative difference in five year old New Zealand children's drawings of a person, including of themselves, after six months of participation in PMP, as compared to a similar control group that did not participate in PMP.

It was anticipated that children who have had perceptual motor training by virtue of their participation in PMP, would draw pictures of human figures with more body parts and would include more details in their drawings than those in the matched control group. The changes in the human figure drawings were measured using the standardised Draw A Person: A Quantitative Scoring System (DAP) by Jack Naglieri. [27] The DAP allows for the quantifying of drawing features with four main categories, namely, presence, detail, proportion and bonus. The DAP contains norms for the drawing of self in addition to the drawing of a man and a woman. [27]

More information about the implementation of PMP within the New Zealand educational context is contained in Appendix A. General information on PMP including PMP screen test,

resource materials, equipment and structural components is contained in Appendix B. Specific information on PMP activity stations is in Appendix C. A glossary of terms and definitions as used in this study is presented below.

1.5 Glossary of Key Terms and Abbreviations

Perceptual motor development *'This is the process of enhancing the ability to integrate sensory stimuli arising from or relating to observable movement experiences.'* [35, p283] It involves the ability to organise and interpret information from the '*various channels of perception (visual, auditory, tactile and kinaesthetic)'* [3, p46] and make an appropriate motor response.

Perceptual motor programme A programme in which children *'move and manipulate their bodies in relation to external objects to match up what they perceive with what is reality.'* [32, p21] Children therefore *'learn various perceptual skills (necessary for optimal functioning) by organizing motor actions directed towards the environment.'* [3, p46]

Smart Start with Perceptual Motor Program (PMP) The specific perceptual motor programme investigated in this study. It was developed by Australian educationalists, Judie Bulluss and Peter Coles. PMP is typically implemented in the first year of formal schooling, preparing the child for fundamental motor skills by *'first developing the basic patterns of movement, namely: locomotion, balance, eye-hand and eye-foot co-ordination, fitness, body image, body control, laterality, directionality, body rhythm and space awareness.'* [2 p10]

Sensorimotor activity programme A programme with activities that aim to affect subcortical brain structures by incorporating the major sensory modalities associated with movement. There is *'considerable overlap'* [35 p286] between the contents of sensorimotor and perceptual motor programmes. This is because perceptual motor functioning is dependent on sensorimotor functioning. [21, 35]

Body image Body image is defined by Bulluss and Coles as *'the complete cognizance of one's own body and its movement possibilities. It is the internal knowledge of the "me-ness of me".'* [2, p16] The cognisance of one's body involves the awareness and knowledge of: the physical structure of the body and its parts; the movements and functions of the body and its parts; and the position of the body and its parts in relation to each other and the environment. [17] Other authors including Humphrey [4] and Williams, [21] writing in a perceptual-motor context use the words **body awareness** instead of body image. Kavale and Mattson juxtapose the words body awareness and body image and write about the *'body awareness/image categories.'* [36, p168]

Draw A Person: A Quantitative Scoring System (DAP) The standardised assessment developed by Jack Naglieri in 1988, used in this study to evaluate the children's drawings. [27]

Decile A school's decile indicates the *'extent to which a school draws its students from low socio-economic communities. Decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic communities.'* [37, p1] This is a system of classifying schools that is unique to New Zealand. (Refer to Appendix D for further information on the decile.)

CHAPTER 2

2.0 REVIEW OF THE LITERATURE

2.1 Introduction

National and international literature has been used to inform this study. Firstly, the literature on perceptual motor programmes is reviewed. This includes a definition of relevant terms and the components of perceptual motor programmes including PMP. PMP is also presented within the New Zealand context. A discussion on body image follows. Alternative usages of the term body image are outlined. The definition of body image as used in this study is then described along with relevant influences. Literature on the measurement of body image and human figure drawings within a perceptual motor and movement context is presented. A study correlating a body image test with a human figure drawing test is reviewed in depth. The history of and research on draw a person tests and children's human figure drawing is then presented. Skills required for human figure drawings by young children are discussed. Relevant influences are also described. Reasons for the choice of the DAP measuring instrument are given along with detailed information on the DAP reliability and validity. Finally, key points from the reviewed literature relevant to chapter three are summarised.

2.2 Perceptual Motor Programmes

2.2.1 Definitions and Components

All voluntary movement depends on perceptual awareness which results from some kind of sensory stimulation. [20, 35, 38] Incoming sensory stimuli from the visual, auditory, tactile and kinaesthetic systems must be interpreted and organised in order for an adaptive motor response to occur. [35] The process of interpreting and organising this incoming sensory information with previously stored information is known as perception. [20, 35] The quality of

one's movement performance depends on the accuracy of one's perceptions and the translation of these perceptions into a series of movement acts. [20] From Gibson's ecological perspective, perception and action are integral: we perceive in order to move and we have to move in order to perceive. [39] Perceptual motor abilities are learnt with this learning process beginning in early infancy. [21, 39] To successfully direct behaviour in the environment, the infant establishes a bodily frame of reference for action. This requires the infant to learn about its body dimensions and its movement possibilities. [39] It is thought that during the early years, most children develop foundational perceptual motor skills through spontaneous interaction with their environment. Many children for reasons such as slower rate of development, nutritional deficiency and lack of opportunity do not develop these fundamental skills to the degree that they should. [21]

Perceptual motor programmes are designed to provide opportunities for children to

> *'move and manipulate their bodies in relation to external objects to match up what they perceive with what is reality.'* [32, p21]

Children therefore

> *'learn various perceptual skills (necessary for optimal functioning) by organizing motor actions directed towards the environment.'* [3, p46]

There are two categories of perceptual motor programmes, structured and unstructured. [4] Structured programmes have prescribed activities which follow a predetermined order like those of Bulluss and Coles [2] and Capon. [17] Unstructured programmes are more flexible with general guidelines and activity suggestions, as seen in the work of Humphrey, [4] Cratty [5] and Kephart. [40]

A review of perceptual motor literature revealed that there is considerable variability in the components of a perceptual motor programme. Gallahue groups the perceptual motor components into body awareness, spatial awareness, directional awareness and temporal awareness. [20] Humphrey includes auditory and visual perceptual skills [4] in addition to those suggested by Gallahue. Williams writes that a perceptual motor programme should address four basic categories of perceptual motor skills, namely: gross motor control; fine motor control (also known as eye-hand co-ordination); simple auditory, visual and tactile-kinaesthetic behaviours; and body awareness. [21] Kephart classifies posture and balance, locomotion, manipulative activities and ball skills as being essential. In addition body image and laterality are also important. [38, 40] Capon promotes the following perceptual motor abilities: loco-motor coordination, balance, proprioception, hand-eye and foot-eye co-ordination, agility, strength, flexibility, body image, laterality, directionality, rhythm and spatial awareness. [17] Body awareness/image is an important component of all of the above perceptual motor programmes.

2.2.2 Components of PMP

PMP is based on the work of theorists such as Kephart, Montessori, Ayres, Doman and Delacato and Capon. [1] Bulluss and Coles developed PMP based on the belief

> *'that formal learning is often introduced before children have mastered pre-requisite skills'* [33, p9]

and that this leads to many children struggling to acquire the basic literacy skills. [2] They reason that

> *'children are growing up in a world where there are no longer activities that allow for the discovery of self, exploration of the environment and input from the extended*

family. Poor diet, inactivity, computer games, and a rush to get children into formal learning may also be contributing to the lack of perceptual motor skill development among some … children.' [33, p9]

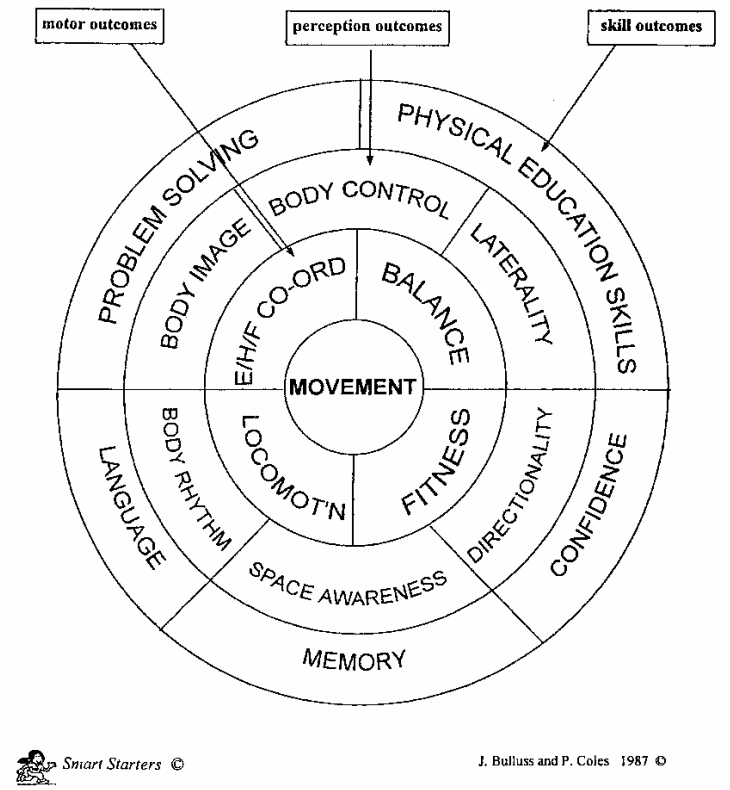
Bulluss and Coles in their PMP floor and equipment sessions, aim to develop

'the basic patterns of movement, namely: locomotion, balance, eye-hand and eye-foot co-ordination, fitness, body image, body control, laterality, directionality, body rhythm and space awareness.' [2 p10]

In addition, Bulluss and Coles have developed specific language follow-up activities for use in the classroom. [2] This is different from the above mentioned perceptual motor programmes.

Bulluss and Coles analyse the PMP equipment session activities in terms of their impact on improving motor, perception and skill outcomes. These outcomes are depicted in a diagram entitled the PMP Outcomes Model. (Refer to Figure 2.2.2 below.) The central core is labelled movement. This core is surrounded by a circle containing the motor outcomes labelled as eye/hand/foot co-ordination, balance, fitness and locomotion. The next circle consists of the perception outcomes, namely the perception of self, space and time. The perception of self consists of body image, body control, laterality and directionality. The outermost circle contains the skill outcomes of problem solving, physical education skills, confidence, memory and language. [2] It is however, the perception of self, specifically body image that is of most interest to this study. The equipment session activities [41] which Bulluss and Coles believe will specifically improve body image are marked with an asterisk in Appendix C.

Figure 2.2.2 PMP Outcomes Model



Copied with permission from J. Bulluss and P. Coles [1, 2]

2.2.3 PMP in the New Zealand Context

PMP has become more popular in New Zealand schools over the last five to eight years. This is partly because it is an integrated programme that includes many areas of the current national curriculum content as outlined by the New Zealand Ministry of Education. [15] (Also refer to Appendix A.) In particular, PMP fits appropriately into the school curriculum area of Health and Physical Education. It provides opportunities for learning in all four strands or areas of Health and Physical Education. These strands are: personal health and physical development; movement concepts and motor skills; relationships with other people; and healthy communities and environments. [42] PMP has been perceived to be beneficial for students especially in the areas of '*developing physical co-ordination, balance, and locomotion.*' [32, p23]

This is especially relevant considering the results of a 1983 New Zealand survey of 335 South Auckland primary school children of which 18.6% had significantly impaired motor skill development as measured on the standardised Bruininks-Oseretsky Test of Motor Proficiency. [43]

2.2.4 Review of Perceptual Motor Programmes

Most of the literature available on perceptual motor programmes and training comes from the USA from the 1970's. [9, 44, 45] Many studies involved older children with learning or intellectual delays. Some perceptual motor studies examined preventative-type of perceptual motor programmes with younger children at kindergarten level. [9, 46] These preventative-type programmes had a focus on school readiness. Cratty and others believe that the optimal time to prevent difficulties in perceptual motor learning is during the pre-school years. [5, 21]

Platzer in 1976 examined the effect of a daily 10 week perceptual motor training programme on gross motor skills and self-concept of 40 four and five year old children. [9] Cratty's Six-Category Gross-Motor Test which includes body perception, gross agility, balance, locomotor agility, throwing and tracking was used to evaluate the perceptual motor skills. Self-concept was measured by the children's drawings of a house, tree and person. The drawings were scored by a qualified expert in projective evaluations using the Goodenough House, Tree, Person Projective Test scoring criteria. The experimental group performed better on the gross-motor test, but the results were not statistically significant. The analysis of the projective test which included a human figure drawing task, revealed significant improvements in self-concept, defined as the child's feeling about self and capabilities. It was concluded that the

programme length should rather be of at least three months duration to achieve the desired goal of significantly improving gross motor skills.

Farr and Leibowitz in 1976 examined the efficacy of a daily eight week perceptual motor programme on kindergarten children from low socio-economic backgrounds. [46] The average age of the twenty children was four years and two months and there were 14 girls and 6 boys. All the children were pre-tested using the Rosner-Richman Perceptual Motor Survey, the Peabody Picture Vocabulary Test and the Goodenough-Harris Draw-a-Person Test. The children were then divided into two groups for the two phases of the study. The mean pre-test scores on the Rosner-Richman Perceptual Motor Survey were approximately equal for Group One and Group Two.

In the first phase, Group One participated in daily one hour perceptual motor activities consisting of: creeping and crawling; tachistoscopic training; walking board; form perception box; blackboard; parquetry blocks; trampoline board; balance board and rocking board. The children were encouraged to verbalise as they participated. Group Two attended their regular pre-school programme during this one hour. The three tests were then repeated. The second phase of this study occurred after a 10 week winter recess. The groups rotated so that Group Two participated in the perceptual motor activities and Group One served as the control. The same three tests were administered prior to and after the perceptual motor programme in this second phase.

The analyses of the test results for the two phases were similar. There was a significant difference in the means for the pre-and post-test scores on the Rosner-Richman Perceptual

Motor Survey for the group that participated in 40 hours of perceptual motor intervention. This also occurred in phase two when the groups rotated. For both phases, the pre-and post-test scores on the Peabody Picture Vocabulary Test and the Goodenough-Harris Draw-a-Person Test showed no significant differences in either the control or experimental group.

The perceptual motor training programme in the study by Farr and Leibowitz had a strong emphasis on visual perceptual and balance activities. Without further details on the programme, it is not clear whether any component specifically addressed body image or awareness. The authors did not give any rationale for the use of the Peabody Picture Vocabulary Test nor the use of the Goodenough-Harris Draw-a-Person Test. Farr and Leibowitz's study results appear to indicate that movement experiences afforded by this perceptual motor training programme did not significantly improve the children's human figure drawing test scores. [46]

There is a significant lack of studies on perceptual motor programmes from the 1980's onwards. Reasons for this are presented as follows. The first is the probable impact of the US Federal Education for All Handicapped Children Act of 1975. This Act stated that all handicapped children (including those with intellectual and learning handicaps) are entitled to a free and appropriate education in the '*least restrictive environment.*' [47, p19] The Act gave federal funds to programmes that placed these children into normal or integrated educational classrooms and extracurricular activities. This Act has been widely interpreted as supporting the expansion of mainstreaming. It is possible that, with the mainstreaming of these children, there may have been a curtailment in perceptual motor programmes as special schools and units closed. Reduced programmes would most likely result in fewer samples for research. In

1994, Cratty wrote in the context of movement interventions, that the US federal government was reluctant to fund large scale normative studies on typically developing children. [48]

In addition the results of a well known [31, 49] meta-analysis in 1983 by Kavale and Mattson, *One Jumped off the Balance Beam*, [36, 50] may have contributed to the decline in the amount of literature on perceptual motor programmes. In this meta-analysis, 180 studies from the 1970's investigating the effectiveness of perceptual motor training that had a control group were utilised. In the 180 studies the average age of the 13 000 subjects was 7.97 years, the average IQ was 89, the average sample size 54 and the average intervention period was 19 weeks. The results of the analysis revealed that perceptual motor training is not an effective intervention technique for increasing academic, cognitive or perceptual motor variables in children with lower intelligence levels. A small treatment effect approaching one tenth of a standard deviation occurred in the balance/posture and body awareness/image categories in over half the studies.

Kavale and Mattson reported that almost half of the 180 reviewed studies were rated low in internal validity due to design, measurement and analysis errors. [36] Perceptual motor training is however, a relatively new area of practice and inquiry and in

> '*new areas of research inquiry, effect sizes are likely to be small (when they are not zero!) because the phenomena under study are not easily controlled experimentally or measured accurately or both.*' [51, p262] '*The gold standard for the assessment of an intervention continues to be the experimental randomised controlled trial.*' [10, p496]

There are however, significant ethical considerations when some subjects are withdrawn from a standard service while a trial is being conducted. [10]

A short-coming of the investigated perceptual motor training programmes in Kavale and Mattson's study is the average programme length of 19 weeks. The authors of PMP believe that programmes of such short duration are not effective. [1]

Kavale and Mattson also mention that there have been

> *'philosophical attacks challenging the theoretical… foundations of perceptual motor training programmes.'* [36, p165]

In the PMP manual, Bulluss and Coles have minimal information on the theory underlying perceptual motor development and research on perceptual motor programmes. [2] Instead they encourage all users to do their own theory reading in order to understand the rationale behind the programme. A list of references is supplied. [2]

Litterick-Biggs and Broadley conducted a small qualitative study which examined how eight members of teaching staff from six New Zealand schools implemented and evaluated Smart Start with Perceptual Motor Program (PMP). [32] On interviewing the eight participants they found that they did not carry out feasibility studies before implementing PMP and neither did they critically read evaluative literature on perceptual motor training programmes. Litterick-Biggs and Broadley concluded that schools and teachers should examine the empirical evidence rather than relying on a high degree of blind optimism in the effectiveness of PMP. Campbell, writing in the Australian context expressed similar concerns. [52]

PMP equipment sessions are based largely on Capon's perceptual motor programme. [1, 17] In 1984, a study on the effect of the Capon perceptual motor programme reported significant perceptual motor gains for the 47 typically developing kindergarten children compared to their

peers in the control group. [53] The 85 children from four kindergartens were predominantly from low socio-economic backgrounds. The Capon Perceptual Motor Scale was used as a pre- and post-test to evaluate the children's perceptual motor abilities. It included a total score with sub-task scores in the following areas: identification of body parts, walking board, hopping, jump and land, obstacle course and balance. The experimental group participated in daily 30 minute developmentally sequenced perceptual motor activities for 12.5 weeks i.e. a total of 63 lessons. The 38 children in the control group took part in undirected physical activity e.g. slides, see-saws during these times. The significant perceptual motor gains attained by the experimental group are encouraging particularly as the intervention period was only 12.5 weeks.

2.3 Body Image

2.3.1 Alternative Usages of Term Body Image

The term body image is important to this study. In order to avoid terminological confusion which is prevalent in literature, [54, 55, 56] the following brief overview summarises alternative usages of the term body image with resulting applications to human figure drawings.

The term body image is widely used in literature in many fields. [57] In the fields of psychiatry and psychology, body image is referred to as the mental image that the individual has of their physical appearance. [58] This is similar to the layman's use of the term. [59] In the fields of psychiatry and psychology, the body image construct has been studied in terms of affective and perceptual disturbances as seen in individuals with anorexia nervosa and bulimia nervosa. [60] Where human figure drawings have been used in these contexts, the scoring and interpretation has focussed on the measurement of body part size. [58]

Within the study of personality and psychoanalysis, body image, the mental self-image, has been inferred from human figure drawings using projection techniques. [11] According to Machover's study of personality, measures such as the details of the body and clothing are interpreted in terms of functional significance. Figure size and placement, and the type of line used are also interpreted as signs of how the individual 'sees' their body and self. [61]

Finally, Koppitz proposed that children's human figure drawings can also be used to assess emotional functioning. Emotional indicators within the drawing are interpreted in the light of how children 'feel' about their bodies and themselves. [61]

2.3.2 Usage of the Term Body Image in the Present Study

Within the field of motor learning and awareness of the body, communication has been hampered by a lack of standardisation of terms. [20, 21] Humphrey and Sherborne explain that the terms body-schema, body-concept, body-sense, body-experience, body-awareness and body-image have been used by different writers for the same related concepts. [4, 18] Humphrey selected the wording body awareness over body image as he found the former to be used more frequently within the literature that he reviewed. [4] Within the researcher's review of the perceptual motor literature, the researcher also found that the terms body image and body awareness occurred most frequently. For example in their meta-analysis, Kevale and Mattson refer to the body awareness/image category. [36]

For the purpose of this study, the term body image will be used according to Bulluss and Coles' definition from the PMP manual. Accordingly, body image is the

'*complete cognizance of one's own body and its movement possibilities. It is the*

internal knowledge of the "me-ness of me."' [2, p16]

Based on the researcher's review of the literature referenced by Bulluss and Coles, [2] it was concluded that Capon's description of body image was most relevant to PMP in general and also specifically to this study. Capon's perceptual motor programme has served as a model for PMP. [2, 17] The cognisance of one's body involves the awareness and knowledge of:

a. the physical structure of the body and its parts;

b. the movements and functions of the body and its parts;

c. the position of the body and its parts in relation to each other and the environment. [17]

2.3.3 Relevant Influences on Body Image

Many factors play a role in the development of this conceptual awareness of the body. These include body sensations, [35, 54, 62] cognitive development and mental imagery. [63] According to perceptual motor programme theorists and developers, the improvement of body image is essential for the development of all other perceptual motor areas. [2, 5] Basic to children's physical performance is their 'vehicle' for movement, their body. [5] Accurate, specific knowledge about their body will provide children with a basis for acquiring motor skills. [21, 63] Children's discovery of what the various body parts are and where they are located helps them to learn about themselves. [63] It is thought by some that children will first learn about the large areas of their body and then the more discrete body parts. They will learn about body planes and movements, and also space awareness, laterality and directionality. [63]

Some researchers, including Cratty believe that the primary way in which these body concepts may be acquired is through participation in carefully sequenced movement experiences. [4, 5]

This would coincide with Kevale and Mattson's meta-analysis assessing the efficacy of perceptual motor training where one of the greatest treatment effect sizes occurred in the body awareness/image category. [36]

2.3.4 Measurement of Body Image and Human Figure Drawings in Perceptual Motor Programme and Movement Literature

The following literature includes studies from child development, movement education and occupational therapy fields. These studies will firstly be described and later evaluated by way of a summary at the end of this section.

Cratty in his book *Perceptual Motor Efficiency in Children*, lists a variety of methods for evaluating body image namely: verbal responses to directions including sequences of movements; pointing to body parts; imitation of gestures; constructing manikins out of disconnected body parts; and drawing pictures of people. [5] Occupational therapists have likewise used a variety of assessments to determine body part awareness. These include pointing to and naming body parts, completing person puzzles and the drawing of a person. [24] Short De-Graff et al write that human figure drawings are a versatile assessment option for occupational therapists. Amongst other uses, human figure drawings can be used to assess perceptual motor function, explore body image and measure intervention effects. [64]

According to Humphrey it is doubtful whether there are any 'absolutely foolproof' methods for detecting body image problems in children. [4] Humphrey explains that signs said to be indicative of body image problems can be symptomatic of other deficiencies such as the mild developmental delay. Broadly speaking there are two ways in which body image deficiencies

may be detected. The first is by making observations of the child's motor behaviours and secondly by the drawing of self. Humphrey cites the drawing of self as a technique often used in literature to diagnose body image problems. He states that it is possible through the drawings of typically developing children to trace certain characteristic stages of perceptual development.

> *'It has been found that drawing a picture of himself assists in helping to detect if there is a lack of body awareness…The primary purpose of this is to see if certain parts of the body are not included in the drawing.'* [4, p58]

Humphrey includes an account of an informal experiment in which a group of children drew self drawings before and after a body image movement game called 'Busy Bee'. In this game, children in pairs performed specific movements according to verbal directions e.g. 'shoulder-to-shoulder' or 'toe-to-toe'. After a few verbal directions were given, 'Busy Bee' was called out and the children changed partners. The game continued in this manner with many body parts emphasised. Before the game, many children did not know where to begin when drawing a picture of self and others omitted some of the major limbs in their drawings. Following the game, the children's self drawings all included a trunk and some had more discrete details e.g. ears and feet. [4]

This view that a child's drawing of self will reveal their body image and perceptual motor development is supported by other literature. Ayres and Reid published a paper in 1966 entitled *The Self-Drawing as an Expression of Perceptual Motor Dysfunction.* [65] They studied the self drawings of 100 children with suspected perceptual motor dysfunction and 50 children without. The children's self drawings were scored according to a scoring system developed by

Ayres which assigned points for presence, detail, proportion and attachment of body parts. The study results revealed that the scores on the self drawing task significantly discriminated between children with perceptual motor dysfunction and those without. This human figure scoring system correlates well with the DAP and similar draw a person tests. [66]

In a study by Numminen et al the self drawings of 150 children ages three to five years were analysed on a five-point scale using Saastamoinen's (1993) test battery. [23] The results showed that typically developing children's human figure drawings develop in line with age. The five year old children's drawings were more detailed and sophisticated with more body parts present. It was asserted that

> *'3-5-year-old children's human figure drawing may reflect the important role that her/his body plays in a certain stage of her/his perceptual development. Through this "physical body image" a child develops understanding of the relationships in her/him-self and of her/him-self and other objects in environment.'* [23, p4]

As a recommendation, opportunities for the development of perceptual motor skills were advocated to aid in the development of body image.

Harris in his book [13] provides details on an early study by Mott S.M. entitled *Muscular Activity an Aid in Concept Formation.* [7] This study investigated the effect on drawing scores following the movement of specified body parts. Children first drew a man. They were then put through a series of exercises emphasising parts of their bodies, verbalising as they moved e.g. 'This is my head, I nod it.' Drawings made immediately afterward were scored using the Goodenough Draw-a-Man Test scale. This scale allocates points for the presence and detail of clothing and body parts, as well as the proportions of body parts (length greater than width).

The post-movement drawings showed that the exercised parts were not only more likely to be shown but were also drawn with more detail.

Harris in 1950 investigated the effect of rhythmic exercises, not emphasised verbally, on children's drawings of a man. [13] The children consisted of 48 boys and 56 girls in first grade from two schools in a lower-middle class district. Both groups were required to draw a man each day for a 10 day period. The experimental group however had 15 minutes of music and games emphasising arm and leg movements prior to their drawing a man. The drawings from both groups were scored according to the Goodenough Draw-a-Man Test scale. [16] The drawings were also scored on a second set of criteria devised for this study: the proportions of the leg, arm, head and trunk length in millimetres, the average angle of the arms and legs in relation to the vertical dimension of the picture and a simple rating based on the amount of movement in the figure. Harris only reported on the results from the second set of scoring criteria where no significant difference was found between the groups. He concluded that motor experience was not projected into the drawings or that a fifteen minute period is insufficiently long to produce a carry-over effect. [13]

More recently, two occupational therapists Parush and Hahn-Markowitz explored the effect of large and small space treatment settings on perceptual motor functioning of 53 pre-school children. [3] The mean age of the children was five years and 7 months. Eight measures of perceptual motor functioning were utilised. This included the drawing of a person which was used as the measurement for body image. The Draw-a-Person Game from the Miller Assessment of Preschoolers [67] was used to score the drawings. A total score was obtained by adding the number of items that were present in the drawing and whether the body parts were

one or two-dimensional. As the Miller Assessment of Preschoolers was standardised on a sample from the USA and norms for Israeli children were not available, the raw scores were used in the data analysis. Subjects in both treatment groups improved as a result of the seven month one-and-a half hour weekly perceptual motor programme. This included gains in the total score for the drawing of a person, seen as the measure of body image. [3]

A study by Painter [14] cited in Culp et al [6] investigated the effects of a sensorimotor activity programme on kindergarten children's body concept. The Goodenough Draw-a-Man Test was used as a measure to detect change in children's conceptual awareness of their bodies. The sensorimotor activity programme resulted in significant gains in knowledge of their bodies as measured by increased scores on the human figure drawing test.

Culp et al investigated the effect of two types of intervention on young children's body concept as reflected in their human figure drawings. [6] Culp et al used the term body concept in a clinical context to mean the total body experiences that enable children to solve body awareness problems. The average age of the 16 preschool children in the two experimental groups, Group A and B, was four years three months. The average age of the eight children in the matched control group, Group C, was four years five months. There were an equal number of boys and girls in the three groups. The Goodenough-Harris Draw-a-Person Test was used as a pre-and post-test to measure changes in body concept. All 24 children drew two sets of pictures including a man, woman and themselves, one set before and one set at the end of the intervention period.

The 16 children in Groups A and B each participated in 13 training sessions, of approximately 45 minute duration over the one month period. Group A participated in the following sequence of activities: 10 minutes of yoga; 30 minutes of perceptual motor type activities (e.g. tumbling on mats, balancing on a beam or other motor activities); five minutes of relaxation/breathing exercises. Group B participated in the following sequence of activities: 10 minutes of body part identification songs and finger plays; 30 minutes of planned activities (e.g. additional songs, flannel board fantasy man, identifying body parts in a mirror or reading 'Bodies'); five minutes of 'Where's Mr. Thumbkin?' Group C was not involved in specific training activities over the month long period.

The data analysed consisted of pre-test and post-test differences of composite drawing scores on the human figure drawing test. Composite drawing scores were obtained by averaging the scores on the man, woman and self drawings. There were no significant differences in the three groups' pre-test scores. Significant differences were not found between the males and females in pre-and post-test comparisons.

There was a significant difference among the three groups' scores following intervention. As predicted, the greater mean gain in scores was in the sensorimotor group, Group A. The mean differences for each group were are follows: Group A gained an average of 9.55 points; Group B gained an average of 4.2 points; Group C gained an average of .55 points. Differences in the pre-and post-test scores were mainly due to the addition of body parts and not to the amount of clothing drawn or body/leg proportion. All drawings were in frontal perspective. The authors concluded that body concept as measured by human figure drawings was significantly altered by the two types of intervention.

What follows is an evaluative summary of the above reviewed literature on the measurement of body image by human figure drawings in a movement context. Humphrey's account of children's improvements in their self-drawings following a body part movement game [4] provides anecdotal support for the use of human figure drawings as a measure of body image. Numminen et al's interpretation of their findings on the developmental changes in young children's self-drawings [23] lacks substantial references to other literature and their work was not peer reviewed. Mott's study showed that verbalisation and movement of body parts results in immediate improvements in body concept as reflected by the inclusion and increased detail of the drawn exercised parts. [7] Like Humphrey's account, however, the absence of a control group limits the reliability of these findings. Parush and Hahn-Markowitz also found that young children's human figure drawings included more body parts following perceptual motor intervention. [3] These changes in the drawings, reported to reflect improvements in body image, in the absence of a control group, could have been affected by maturational or spontaneous learning factors.

Harris's rhythmic exercise study included a control group but also used different criteria for scoring the human figure drawings. [13] Harris did not provide information on the changes in overall drawing score. When additional criteria, including body proportions (measured in millimetres), were evaluated the difference between groups was not significant. Harris considered that the 15 minute exercise period may have been insufficient to produce changes in the drawings.

Finally, Culp et al's study which used a control group was presented in detail. [6] Their findings favour movement experiences over language training for improving body concept as reflected

in children's human figure drawings. The experimental groups participated in 13 three quarter of an hour sessions over one month. Culp et al found that the changes in the pre-and post-test drawing scores were mainly due to the addition of body parts as measured by the Goodenough-Harris Draw-a-Person Test. A criticism of their study is that the drawings of self with corresponding instructions have not been standardised in the Goodenough-Harris Draw-a-Person Test. [13] Culp et al's findings are very positive considering that the intervention period was only one month.

2.3.5 Body Image Measures Correlated with Human Figure Drawing Tests

In the earlier described study by Ayres and Reid entitled *The Self-Drawing as an Expression of Perceptual Motor Dysfunction* a modest but significant correlation of .32 was found between the children's self-drawing scores and their ability to identify different parts. [65]

Woodburn et al stated that body image can be measured by drawings of the human figure. [68] They examined what specific aspects of body image can be measured by human figure drawing tests using the Goodenough-Harris Draw-a-Person Test and a body image test in Costa Rican children. [68] A Spanish version of the Goodenough-Harris Draw-a-Person Test was used. A prior study by Ceciliano-Rogers and Woodburn, cited in Woodburn et al, [68] had found the estimated reliability of this version to be good at .83 and likewise good objectivity at .87. The Spearman-Brown coefficients were good ranging from .87 to .92.

Woodburn et al used the Body Image Diagnostic Test-Universidad Nacional, a Spanish body image test developed by Woodburn and Mendez in 1988. The test is based on the progressions outlined in Cratty's 1970 body image scale. The 94 items on the body image test were judged

to be valid by 12 educator judges with 75% to 92% agreement. The reliability with 300 five and a half to nine year old Costa Rican children was .82 for stability and .85 to .94 for internal consistency (Spearman-Brown). The inter-rater agreement was good at .85 for the whole test and ranged from .69 to .85 on the subtests.

The body image test has four subtests:

1. Body Parts and Planes: measures children's ability to identify their body parts and planes and spatial relations between them and stationary objects;
2. Body Movements: measures children's ability to move their trunk and whole body to show spatial directions and perform non-locomotor movements;
3. Laterality: measures children's ability to identify their left and right on self and with objects and to use left-right judgements to establish spatial relationships between self and stationary and moving objects;
4. Directionality: measures children's ability to use directional concepts to establish the laterality of stationary and moving objects in space, alone and in relation to other objects.

The 90 children in Woodburn et al's study consisted of 30 children in kindergarten, 30 in first and 30 in second grade. There were 49 boys and 41 girls. The age range was from five and a half to seven years in kindergarten and six and a half to nine years in the other two grades. The Goodenough-Harris Draw-a-Person Test and the body image test were administered to the children over a two week period.

The correlations between the Goodenough-Harris Draw-a-Person Test total score (average of man and woman drawing scores) and the body image test were significant and positive (r=.49). Important correlations were also found when the total scores on the body image test were correlated with four subtest scores on the Goodenough-Harris Draw-a-Person Test, namely: identification of all the elements on the trunk and limbs (r=.47); proportion (length greater than width) of trunk and extremities (r=.41); identification and proportion (combination of previous two subtests) (r=.49); identification and proportion of body trunk (all details in prior subtest that are on the central part of the body) (r=.50). Slightly lower coefficients were obtained when the total Goodenough-Harris Draw-a-Person Test scores were correlated with each of the four subtests on the body image test (from .30 to .43).

Particularly relevant to this current study is the significant correlation of .43 between the body planes and body parts aspect of body image test with the children's performance on the human figure drawing test.

2.4 Children's Human Figure Drawings and Draw A Person Tests

2.4.1 Abilities Required for Human Figure Drawings with Reference to Specific Draw A Person Tests

The progression in children's drawings from non-symbolic marking to graphic symbolism can be attributed to inter-related developmental changes in their cognitive-conceptual, perceptual and motor systems. [69, 70, 71] Cognitive skills are firstly described with specific reference to the following human figure drawing tests, namely the Goodenough Draw-a-Man Test, the Goodenough-Harris Draw-a-Person Test and the Draw A Person: A Quantitative Scoring

System (DAP). A brief account of these three tests is given in this section. Perceptual and visual-motor skills are then discussed with reference to the above drawing tests.

The use of children's drawings to estimate cognitive ability is an approach that has been researched since the late 1800's. [16] Goodenough in 1926 published findings that children's drawings of a man can be correlated to their level of intelligence. Goodenough stated that the human figure drawing task is

> *'useful in the analysis of specific mental functions and in the study of the development of conceptual thinking during early childhood.'* [16, p13]

Goodenough postulated that the following cognitive processes are required by a child when performing a freehand human figure drawing task: association by similarity; analysis and synthesis of parts and spatial relationships; judgements of quantitative relationships and of relative proportions; abstraction and adaptability. [16]

The Goodenough Draw-a-Man Test or scale as it was initially known was established as a measure of non-verbal cognitive ability. This scoring system consists of 51 possible points based mainly on the presence, detail and proportion of body parts in the drawing of a man. It was normed on nearly 4000 US children including 375 children in the five year age group. Age norms were given for the number of points obtained with the resultant approximate mental age of the child. Standard scores were not provided. [16]

This test was refined by Harris in 1963 through the addition of a drawing of a woman and a drawing of the self. [13] Separate standard scores for boys and girls are provided for the man and woman drawings. Harris's norms were initially based on 3000 US children with 75 finally

selected in each age level from kindergarten (age five) to 15 years. The man drawing is scored on 73 items and the woman drawing on 72 items. Only 42 items are common to both scales. [72] The majority of the test items can be grouped into four categories: motor control and coordination (seven items); proportions (nine items); depiction of features (18 items); detail in features (33 items). [73]

Harris discussed the abilities required by this drawing test as those of intellectual or conceptual maturity rather than intelligence per se. [13] Accordingly, conceptual maturity involves the child's ability to form concepts of an increasingly abstract nature, requiring perception, abstraction and generalisation.

> *'This change gets away from the notion of unitary intelligence and permits considerations of children's concepts of the human figure as an index or sample of their concepts generally.'* [13, p5]

Children's level of conceptual awareness of their bodies is therefore important in helping them to draw pictures of themselves and others. [13, 66] Woodburn et al's study confirmed this finding a significant correlation between children's Goodenough-Harris Draw-a-Person Test scores and their body image test scores. [68]

The Goodenough-Harris Draw-a-Person Test was used for over 20 years as the main rating approach applied to children's drawings to estimate cognitive ability. [27] Studies have shown the Goodenough-Harris Draw-a-Person Test to be a predictor of future academic success. [74] It has been shown to be a fairly adequate screening estimate of intellectual ability with reported correlations with the Wechsler Intelligence Test for Children Revised (WISC-R) ranging from .40 to .64. [66, 75] Strongest correlations occur specifically between the performance component

of the WISC-R and the human figure drawing test scores. The ability to conceptualise and draw human figures demonstrating detail and accuracy is similar to the visual conceptual abilities measured on the WISC-R. [75]

Criticisms of the Goodenough-Harris Drawing Test [66, 76] led to the development of the Draw A Person: A Quantitative Scoring System (DAP) by Jack Naglieri in 1988. [27] The DAP increased the precision of the standard scores by providing norms for half-year and quarter-year age intervals. The DAP provides norms for the Self drawing and a composite standard score (Total score) consisting of the scores of all three drawings, Man, Woman and Self, for greater reliability. The DAP scoring system has 14 criteria, consisting of presence, detail, proportion and bonus categories. (Refer to section 2.5 in Chapter Three and Appendix H for more information on the DAP.)

To date the most widely examined methods for scoring children's human figure drawings as measures of cognitive ability are the Goodenough-Harris Drawing Test and the DAP. [66]

Other cognitive abilities required by children when completing freehand human figure drawing tasks include attention, [24, 77] working memory, [69] motor planning [73] and visualisation or imagery. [67, 78, 79] Typically children need to have a mental model or internal representation of the object to be drawn. [28, 29, 80] The most commonly drawn object by young children is that of the self. [23] At around four to five years of age, children are considered to have graphic routines which are efficient enough to enable them to draw familiar objects or topics. [28] These graphic routines are required for both the 'what of drawing' i.e. the representation of the

subject matter and the 'how of drawing' i.e. the process of how the physical movements are organised when drawing. [28]

Perceptual abilities are also required for the human figure drawing task. [71] Bodily sensations, textures, sounds, smells, tastes and visual shapes and forms can be represented within the drawing once perceived and organised. [71] Children need to develop a sensitive perceptual awareness of self, others and their environment in order to represent their experiences graphically in a holistic and developmentally appropriate manner. [70, 71, 81]

Blind children's human figure drawings have been found to have less detail. [71] Autistic children's drawings of the self and others have been found to lack distinguishing features in line with their restricted social awareness. [81] Human figure drawings by children with right hemisphere injury lack spatial organisation with body parts attached in inappropriate places. [82]

The relationship between children's visual perceptual skills and drawings of human figures was specifically studied by Armentrout. [83] A group of 38 at-risk children who had just completed kindergarten took part in a six week perceptual skill training programme. The perceptual training component consisted of visual perceptual, fine motor and body image activities. The children also took part in physical education, speech and language skills and pre-reading skills. The children's drawings of a man and woman were scored using the Goodenough-Harris Draw-a-Person Test. Marianne Frostig's Developmental Test of Visual Perception was used as a measure of visual perceptual skills. Both tests were administered prior to and at the end of the six weeks. Scores on both tests increased significantly with

modest inter-correlations found between the human figure drawing test and the visual perceptual test.

The drawing of a person also requires the coordination of visual perceptual and finger-hand movements, known as visual-motor integration. [74, 84] A study by Duffey et al found a significant .46 correlation between 80 kindergarten children's scores on the Goodenough Draw-a-Man Test and the Developmental Test of Visual-Motor Integration (VMI). [74] The VMI requires children to copy a series of developmentally graded geometric forms. Similar findings between children's copying ability of geometric forms and their human figure drawing performance have been reported by Oakland and Dowling. [75]

Children's drawings of human figures when scored using the Goodenough Draw-a-Man Test and the Goodenough-Harris Draw-a-Person Test are awarded points for motor control or co-ordination. Barnett and Henderson used the Goodenough-Harris Draw-a-Person Test as a test of drawing ability in a study on clumsy children's drawing performance. [73] The greatest difficulty for the clumsy children was in the seven motor control and co-ordination test items. The lines on their human figure drawings were irregular, poorly controlled and did not meet cleanly at junctures. Shapes were often incomplete and shading was frequently inaccurate and variable. Harris found a .34 correlation between a tracing test and children's performance on the Goodenough-Harris Draw-a-Person Test. [13] The DAP however, does not assign points for exact or complex motor skill [27] and hence children are not unduly advantaged or disadvantaged for their fine motor ability.

In contrast, the influence of children's fine motor abilities has been found to be particularly important in the projective usage of human figure drawing tests. [69] Individual differences in fine motor skills have been found to confound the drawing variables and outcomes of personality assessments. [69] For example, the interpretation of signs such as the thickness of line, shading and size of human figures are greatly affected by fine motor ability. [61]

In summary, the abilities most strongly associated with typically developing children's performance particularly on the DAP and similar draw a person tests are: general cognitive abilities including conceptual knowledge about the body; visual perceptual abilities and visual-motor integration. [75]

2.4.2 Influences on Human Figure Drawings with Reference to Specific Draw A Person Tests

Within the literature on children's human figure drawings a number of influences have been identified and described. The most noted is age. With increase in chronological and mental age, the way boys and girls draw various parts of their human figures changes in a systematic manner in most Western cultures. [85, 86] Children around the ages of three to four years draw tadpole figures consisting of a head with single lines attached to represent the limbs. [85] Some children around age four draw a transitional form which has longer lines for legs. The longer legs are thought to represent the trunk because the arms are attached to these legs. [85]

From age five upwards, children add a trunk below the head. This is an important milestone making the figure look more normal. It is now known as a conventional human figure drawing. Up until the age of 12 or 13 years children add more and more body parts to their

drawings of people. [85] As each feature is added, it is clearly delineated so that the figure has an overall segmented appearance. Later, children begin to use a continuous contour to unite the previously segmented parts. Most of the human figures drawn by five year old children are segmented, while nearly all nine year olds draw contoured figures. [85] Young children's drawings are drawn in the characteristic frontal view or canonical orientation. It is uncommon for children under the ages of nine years to draw the human figure in profile view. [16, 85]

Researchers, including Cox, have challenged the claim by Di Leo and others that the human figure drawing task is culture-free. [69, 85, 87] Differences in human figure drawing performance using the Goodenough Draw-a-Man and the Goodenough-Harris Draw-a-Person scoring systems, have been reported in a range of different cultural groups. [85, 88] For example, in 1932 Paget using the Goodenough Draw-a-Man Test, found that among 4000 drawings produced by 967 Maori children in New Zealand, the proportion of figures drawn in profile increased from 61% at age five years to 88% at age eight years. [85, 88]

Harris wrote that for the most valid results, points of the Goodenough-Harris scoring scale should be re-standardised for every group having a distinctly different pattern of dress, way of life and level of education. [13] Naglieri designed the DAP scoring system to reduce some of the cultural influences, particularly in the area of style of dress, making the DAP less culturally loaded than Goodenough's and Harris's scoring scales. [27, 89]

Besides age and cultural factors, another important influence on children's performance on human figure drawing tests is that of gender. Goodenough noted that girls performed slightly better on the Draw-a-Man Test than boys. The most marked differences were of a qualitative

rather than a quantitative nature. [16] Harris gave separate norms for boys and girls. [13] Strommen and Smith found that girls outperformed boys on the Goodenough-Harris Draw-a-Person Test by an average of two points at ages five to seven years. At age eight boys outperformed girls by an average of four points. [72]

Woodburn et al did not find that gender was an important aspect of variance in their study examining the relationship between the Goodenough-Harris Draw-a-Person Test and a body image test in Costa Rican children. [68] Likewise Oakland and Doweling found that gender was unrelated to performance on this drawing test with white, black and Mexican American children. [75]

The DAP does not have separate norms for males and females. In a sample of 1500 children Naglieri found a small difference between girls' and boys' drawings scored using the DAP system. He concluded that it had little practical significance. [27] Hagood using the DAP to score 306 drawings by 34 primary school children, found no significant difference between boys and girls over the three phases of the year long study. [89]

Socio-economic influences were not found to be significant in Golomb's extensive studies of the representational development of children's human figure drawings. [71] In contrast, Oakland and Dowling found that children from the lower socio-economic group scored lower than children from the middle-income group on the Goodenough-Harris Draw-a-Person Test. [75] They and others concluded that socio-economic differences are more important than racial and ethic group membership in determining differences in performance on human figure drawing tests. [75, 90]

Children's drawings of people are also influenced by schooling and educational level. [13, 87, 88] Schooling provides opportunities to practise writing and drawing, introducing children to the concept of signs and symbols. [69, 87] Even limited educational opportunities have led to children from graphically naive societies producing conventional Western type of figure drawings [87] as described at the beginning of this section.

Artistic influences from art within societies, formal art lessons and artwork within popular culture can affect how children draw human figures. [88] Children also learn drawing techniques from their peers and adults. [87, 88] Direct training in drawing the human figure has been found to affect the human figure drawing test results resulting in increased scores. [13, 16]

In summary, there are a number of influences on children's performance on human figure drawing tests. Researchers have agreed on the particular influences of age, schooling and art. There is some dispute over the influence on culture, gender and socio-economic status.

2.5 The DAP Measurement Instrument

2.5.1 Reasons for Selection of the DAP

The DAP was selected as the measurement instrument for this study for a number of important reasons. Firstly, the DAP has been well standardised on large numbers of children and is considered to be methodologically sound. [27, 66, 91] The reliability and validity of the DAP is discussed below in detail. Secondly, according to recent literature, the DAP along with the Goodenough-Harris Draw-a-Person Test is the most widely examined method for scoring children's drawings from a cognitive-conceptual developmental perspective. [66, 91, 92] In

developing the DAP Naglieri used material from Goodenough [16] and Harris. [13] Correlations between the DAP and Goodenough-Harris Draw-a-Person Test are high. [27, 66]

The DAP was developed in 1988 and was selected by the researcher over the Goodenough-Harris Draw-a-Person Test which was developed in 1963. As advocated by Harris and Naglieri, it is important to use the most contemporary instrument available when scoring children's drawings of a person. [13, 27, 89] The DAP scoring system reduces the influence of the current style of dress, making it less sensitive to current fashion trends and cultural influences. [27, 89]

The Goodenough-Harris Draw-a-Person Test has been criticised for being outdated and the scoring instructions have found to be imprecise on some items. [27, 93] Concerns have been raised about its concurrent validity. [66]

The DAP, unlike the Goodenough-Harris Draw-a-Person Test, offers norms for the self drawing. Naglieri advocated the use of the total score based on three drawings which he found to be more reliable. [27, 89] The DAP has increased precision in its scoring system with half-year and quarter-year intervals. [27] In contrast, the Goodenough-Harris scoring system has one year-intervals. [13]

The Goodenough-Harris Draw-a-Person Test is time consuming to score. [66, 94] This detailed scoring system may be more useful for older rather than younger children. For example Piersal and Santos found that with five year old children, a maximum of 20 out of the 73 possible scoring categories were used with the Goodenough-Harris Draw-a-Person Test. [94] In contrast

the DAP system is shorter with only 50 items (without the 14 bonus points) grouped into 14 criteria. The same 14 criteria are used for all three drawings. The DAP scoring system is easy to learn and quick to administer. [66, 91]

Within the New Zealand context, no published standardisation studies were found on the DAP or Goodenough-Harris Draw-a-Person Test. New Zealand test use patterns show that the Wechsler Intelligence Scale for Children-III and Ravens Standard Progressive Matrices are used as cognitive assessment measures for children. Human figure drawing tests of the projective kind rather than the cognitive kind are used in a limited manner in New Zealand. [95]

2.5.2 The DAP Reliability

The DAP was standardised on a sample of 2 622 individuals aged five through 17 years from the USA. This sample was matched to population characteristics according to the US Census figures. A sample of approximately 200 individuals in each of the 13 one-year age groups between 5 and 17 years was determined as being large enough to yield stable norms. [27]

The DAP's internal consistency coefficients were calculated using the standardisation sample. The DAP Total score (sum of the Man, Woman and Self scores) reliability coefficients (Chronbach Alpha) ranged from .83 in the 12 year age group to .89 in the five year age group.

> *'This indicates good internal consistency of scores across the 14 scoring criteria and the three drawings.'* [27, p14]

The DAP's reliability coefficients of the Man, Woman and Self scores ranged from .56 to .78. In the five year age group the internal consistency scores were .70 for the Man and Self scores

and .71 for the Woman scores. Thus in the five year age group, the reliability coefficient of .89 for the DAP Total score is much higher than the individual drawing scores. [27]

The stability of the DAP scores was studied by retesting a sub-sample of the standardisation sample. This test-retest study consisted of 112 individuals from grades one through seven and was conducted four weeks after the initial testing. It revealed a mean stability coefficient for the Total Scores of .74. The mean coefficients for the Man, Woman and Self scores were not as high and were .70, .65 and .58 respectively. [27]

The DAP manual reports on a study by Gottling in 1985 (an unpublished master's thesis) which compared the interrater reliability of the DAP to the Goodenough-Harris scoring system. A sample of 45 children in elementary school (15 each in grades one, two and three) and 44 children in junior high school (approximately 15 each in grades five, six and seven) was obtained. The students (approximately half females and half males) were tested in groups in their regular classes by their teachers. Two examiners trained in both test scoring systems then scored the drawings. The coefficients (product-moment correlations) of the DAP and Goodenough-Harris scoring systems at the elementary and junior high school levels were good with a range of .86 to .95. [27]

Intrarater reliability was obtained from the same study with the drawings being scored, using both scoring systems, a second time by the same two examiners. The first examiner scored drawings from children in grades one through three and then rescored them after an average of 16 days. The second examiner followed the same procedure with the grade five through seven

students, with an average time interval of 25 days. The results of these coefficients were good with a range of .89 to .97. [27]

2.5.3 The DAP Concurrent Validity, Criterion Validity and Applications

The concurrent validity of the DAP in relation to the Goodenough-Harris scoring system is reported from four studies. The first was Gottling's study which used the 89 students described above. The students' drawings of a Man, Woman and Self were scored by one examiner according to the two different scoring systems. The results indicated that

> *'the two scoring systems yield standard scores that are highly correlated'* [27, p17]

with correlations higher than .76.

The second study had a sample consisting of 100 nine-year olds (half boys, half girls) which were taken from the DAP standardisation sample. Two trained scorers each scored 50 cases using both scoring systems. These correlations were high ranging from .80 to .87. [27]

Harrison et al found a strong relationship between the DAP and Goodenough-Harris scoring system in a study with 75 kindergarten children. [96] Abell et al reported a correlation of .79 between the DAP and Goodenough-Harris scoring systems with 200 children aged six to 15 years. [66]

Within the DAP manual Naglieri has made no attempt to interpret the results of the DAP in any way other than as a statement of developmental maturity. [27, 89] Within the manual two studies are given which provide support for the DAP as a nonverbal measure of ability. The first study involved the students from the DAP standardisation sample. Naglieri's Matrix

Analogies Test-Short Form (MAT-SF) was used as the test of nonverbal ability. It utilises abstract figural analogies of the progressive matrix type.

> *'The DAP Total, Man, Woman, and Self standard scores correlated significantly with the MAT-SF.'* [27 p19]

The second criterion-related validation study compared the Goodenough-Harris scoring system with that of the DAP in a sample of 100 nine year olds taken from the DAP standardisation sample. The correlations with the MAT-SF were not

> *'significantly different for the two scoring methods, indicating that they have comparable validity as measures of (non-verbal) ability.'* [27, p19]

Later studies have investigated the relationship between children's performance on the DAP and other ability measures. In 1990, Harrison et al correlated 75 kindergarten children's drawings scored with three scoring systems including the DAP, with the Standford Achievement Test and Otis Lennon School Ability Test. [96] Harrison et al reported some stastical support for the validity of the DAP, Goodenough-Harris Draw-a-Person Test and McCarthy Draw-a-Child (subtest from the McCarthy Scales of Children's Abilities) in predicting later school ability and achievement.

In 1989, Wisniewski and Naglieri found a modest concurrent validity coefficient of .51 between the DAP scores and Wechsler Intelligence Scale for Children-Revised. [97] In 2001, Abell et al correlated two groups of 100 children's drawings measured using the DAP, Goodenough-Harris and Ayres and Reid scoring systems with the two versions of the Wechsler Intelligence Scales for Children. Correlations ranged from .29 to .55. The most

significant correlations were found between the younger children's performance on the DAP and Goodenough-Harris tests and their performance intelligence quotient. [66]

The reviewed literature shows that the DAP has good reliability and validity. Abell et al, Hagood and Harrison et al reported that the DAP can be used as a developmental measure of non-verbal cognitive ability. [66, 91, 96] Naglieri, like Harris, in interpreting his drawing test views the DAP as a measure of developmental maturity. [13, 27, 89] Children's human figure drawing tests like the DAP have important advantages in that they are child-friendly, cost-effective and less influenced by linguistic variables. [76, 98] The DAP scoring system in particular is easy to learn and score. [27, 91] The DAP is well correlated with the Goodenough-Harris Draw-a-Person Test. [27, 66, 96] The DAP, like the Goodenough-Harris Draw-a-Person Test, [68] can be used as a measure of children's body image as children's knowledge of their bodies will be reflected in their drawings of people. [6, 13, 16] Ayres and Reid aptly wrote that

> *'Ever since Goodenough (1926) demonstrated the value of drawings of a man as indices of children's intellectual capacity, variations of her technique have been used as expressions of cognitive, affective, and organic function. It commonly has been inferred that, in contrast to the drawings of other objects, depicting the human figure reflected the status of the drawer along the many dimensions that contributed to the perception of himself.'* [65, p254]

2.6 Literature Review Summary

The investigation of perceptual motor programmes falls within the domains of developmental occupational therapy, special and movement education. [2, 5, 9] Children's awareness of their bodies and resultant movement possibilities are important for the accuracy of their perceptual

motor responses. [20, 39] The improvement of children's body image is therefore an essential outcome of PMP [2] and perceptual motor programmes in general. [17, 20, 21] Children's body image is seen to be reflected in their drawings of self and others. [3, 64] Human figure drawing tests like the DAP, which score for presence, detail and proportion of body parts [27] can be used to measure developmental changes in children's body image.

This study investigated the effect of PMP on young children's drawing of a person, including self, as measured by the change in their scores on the DAP. The following key points from the above literature review were relevant for this study's research methodology:

- A quasi-experimental design was utilised to examine the effectiveness of the PMP intervention taking into account ethical issues [10] and the need for a control group to control for maturation and spontaneous learning factors; [3]
- The number of weeks that the children participated in PMP was to be greater than 19 weeks; [36]
- The children in this study were aged five as by this age they have sufficient knowledge of their body parts and the ability to create human figure drawings. [28, 85] In addition, PMP is typically introduced in the first year of schooling when children are aged five; [2]
- Children from the experimental and control groups were from similar socio-economic backgrounds to reduce the influence of this variable on test scores; [75, 90]
- The numbers of boys and girls in each group was as similar as possible as the effect of gender differences of human figure drawing performance has been inconclusively reported on in the literature; [13, 16, 27, 68, 75, 89]
- The effect of PMP on children's drawing of human figures was statistically

evaluated utilising the DAP as it is the most recent instrument, has good reliability and validity, increased precision of the standard scores and norms for the Self drawing; [27, 66, 89]

- The DAP Total score was computed and utilised in the data analysis. The Total score has the highest internal consistency coefficient in the five year age group. The Total score has also been shown to have the best test-retest reliability over the individual drawing scores; [27]
- The DAP Self score was also calculated and analysed as the self drawing received emphasis in literature; [23, 64, 65]
- As the DAP has not been standardised on the New Zealand population, the raw scores [3] for the Total and Self scores were also analysed. It was beyond the scope of this study to undertake the standardisation of the DAP scoring system on the New Zealand population.

CHAPTER 3

3.0 MATERIALS AND METHODS

3.1 Introduction

The purpose of this study was to examine the effectiveness of PMP on enhancing the ability of five year old New Zealand children to draw human figures. The following research question was investigated: Will there be a significant quantitative difference in five year old New Zealand children's drawing of a person, including of themselves, after a six month period of participation in PMP, as compared to a similar control group that does not participate in PMP?

3.2 Research Design

A quasi-experimental pre-test post-test research design was used. This specific methodology was selected because a control group was needed in order to discount for maturation effects between the initial administration of the DAP and the re-administration six months later. Therefore, two groups of five year old school children were compared by virtue of their participation (experimental group - School A1) and non-participation (control group - School A2) in PMP. These children's drawings were quantitatively assessed, before commencement in PMP and six months later and the results were compared.

3.3 Sample Size and Selection

For this study a normally distributed sample was required to enable meaningful comparisons between the control and experimental groups. In a normally distributed sample differences between children, such as fine motor skill ability, intelligence and activity levels, can be controlled for. This is because the nature of normal distribution allows for varying levels of ability. In order to determine this study's sample size needed for a normal distribution, the

scoring sensitivity of the DAP with five year olds from New Zealand would have been required. As no such specific data was available ideally it would have been necessary to conduct a preliminary study prior to this study. This was outside the scope of this research study. Based on sample sizes from the reviewed literature the total sample size needed to be greater than 20 subjects, [46] preferably close to 30 in each group [68] to obtain a normal distribution.

The participants in this study, five year old children, were selected using purposeful sampling based on the following selection criteria:

- All children were enrolled in local primary schools in the Rotorua region. Children in New Zealand enter primary schooling on their fifth birthday (year one). [99] (The class sizes increase during the year, as more children enrol after turning five.)
- The New Zealand school year runs from late January or early February to December. Children who entered school after mid-February were excluded from the study. This allowed for the subjects to participate over a six month period from approximately mid-February to mid-August.
- Each child was five years old for the duration of the study.
- Similar gender composition of the children in both groups was required.
- The children were from the same socio-economic background based on the schools' decile rank. (Refer to Appendix D for the information on the school decile.)
- Each child had signed parental consent to participate in the study and gave verbal assent to completing the test. (Refer to Appendix E for copies of these forms.)
- None of the children had known development disabilities, identified by having no prior involvement with the Group Special Education Early Intervention Services.

3.4 Selection of Schools

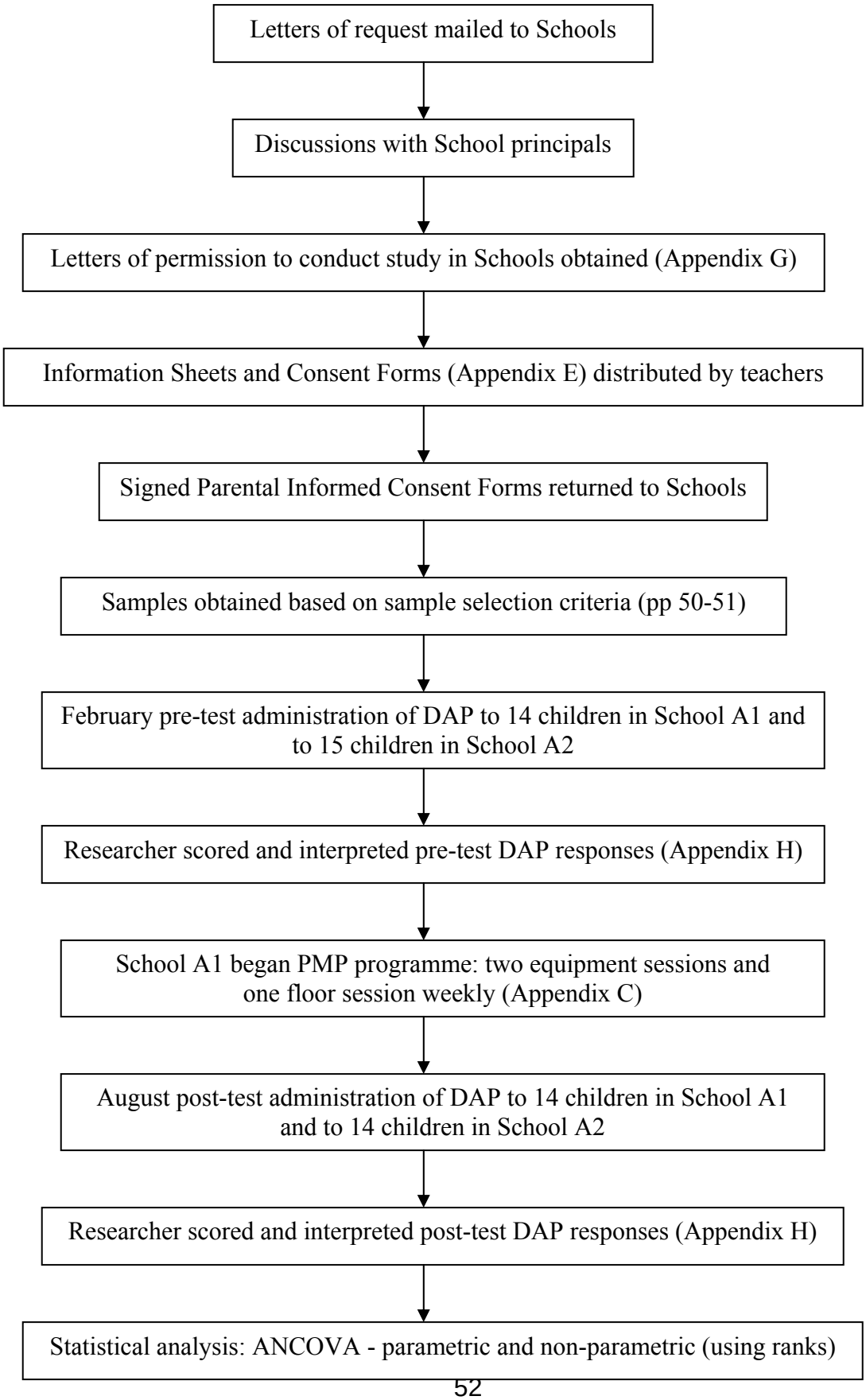
Following enquiries it was established that four schools in the Rotorua region conducted PMP. These schools formed the population from which the experimental sample was drawn.

- Of the four schools, three were not suitable for the following reasons: one was a rural school in an isolated area and a suitable school from which to draw a similar sample to serve as a control group could not be found; the second school conducted PMP for only one term of the school year and this was not a long enough duration for this study; the third school was an urban school of decile four ranking and a school of equal or similar ranking did not exist in this region.
- The remaining school which conducted PMP, School A1, was a decile two school with children from a low socio-economic community. [100] School A1 conducted the PMP equipment sessions twice a week following the sequential activity cards and utilising the prescribed equipment. The floor sessions were performed once a week. School A1 has been conducting PMP for one year.
- School A2 was selected based on recommendations by the principal of School A1 as being the most similar school to School A1. School A2 was also a decile two school with children from a low socio-economic community. School A2 did not conduct PMP. The children from School A2 participated in standard physical education sessions three times a week for 45 minutes for the duration of the study.

3.5 Research Procedure

The research procedure for this study is summarised in the Figure 3.5 below.

Figure 3.5 Flow Diagram of Research Procedure



3.5.1 Ethical Clearance Procedures

Ethical clearance was obtained for this study from the Faculty of Ethics committee. (Refer to Appendix F.) An introductory letter outlining the proposed study and requesting permission to conduct the study in the schools was mailed to Schools A1 and A2. Appointments were then made with both school principals where the study proposal was further discussed. Both principals then signed letters granting support for the study. (Refer to Appendix G.)

Study Information Sheets and Parental Informed Consent Forms were then distributed by the class teachers to children that met the inclusion criteria in the year one classes at School A1 and School A2 respectively. (Refer to Appendix E.) The parents then returned the signed Parental Informed Consent Forms to Schools A1 and A2. Only those children, whose parents returned a signed Parental Informed Consent Form allowing them to participate, were included in the study. The associate principal at School A1 and senior junior teacher at School A2, kept the signed consent forms and gave them to the researcher at the time of the February administration of the DAP.

3.5.2 DAP Administration

The DAP may be administered in a group or individual setting. [27] The researcher administered the DAP in a group setting at both schools in February and August. Standardised administration procedures were utilised namely, the use of the same set of instructions for all the children, the same drawing materials, same time of day and the same examiner.

At the pre-test and post-test DAP administrations the researcher distributed the DAP response forms and pencils to the children. Where necessary the children were given assistance with

writing their first name on the cover of the DAP Response Form. The researcher then asked the children to draw a man, woman and themselves on the separate pages of the DAP response form. The children used HB pencils that were sharpened on a regular basis. Drawings were consistently made in the same order. The wording of the instructions varied according to the manual and was as follows:

> *'First/this time/now I'd like you to draw a picture of a man/woman/yourself. Be sure to draw the very best picture that you can. Take your time and work very carefully, and I'll tell you when to stop. Be sure to draw the/your whole man/woman/self. Please begin.'* [27, pp23-24]

The children were given a maximum of five minutes for each drawing. If the children asked questions, the researcher repeated the instructions. The drawings were not collected until all the children were finished. The children were enthusiastic and appeared to give of their best when doing the drawings in February and again in August.

For the February pre-test DAP administration, the children from both schools were assessed in their respective classrooms seated in small groups around tables or grouped desks. Their teachers were present. At this early stage in the school year the total number of children (study participants and non-participants) in the classes at both schools was small (less than 15). The non-participants at School A1 and A2 performed other table top activities during the test administration. At School A1 the study participants were from three different classes with six, four and four children respectively. At School A2 the children in the control group were from two classes with eight from one class and seven from the other class. Overall class sizes at School A2 were a little smaller than those at School A1.

At the August post-test administration of the DAP, the class sizes in both schools had increased as more children had started school, having turned five during the course of the year. It was thought that it may be quieter and more conducive to test conditions if the study participants were assessed elsewhere. As a result of this the children at School A1 and A2 were tested in one large group in a room attached to the hall. Their respective associate principals were present for the duration of the second administration.

The researcher collected the completed DAP Response Forms. The class teachers provided the researcher with the children's birth dates from their class records. The researcher then filled in the birth date, gender, date of testing and school on the cover of each Response Form. In addition, the researcher also wrote an assigned number on each Response Form. Thus each child was allocated a number to protect their identity and from this point onwards only this number was used to identify the data. The drawings were then scored and interpreted by the researcher at her home.

3.5.3 Learning the DAP Scoring System

Prior to scoring the drawings, the researcher completed the following procedure outlined in the DAP manual for learning the scoring system: *Description of DAP Scoring System* was read; the 14 criteria and 64 items were studied; six drawings in the *Worked Examples and Comments* section were scored and reviewed; five drawings in *Competency Test I* were scored; these five drawings were then reviewed in the light of the comments provided. The minimum competency of 90% correct agreements was exceeded so the researcher could then proceed with scoring the subjects' drawings. [27]

3.5.4 Description of the DAP Scoring System

There are three main components in the DAP scoring system: items, criteria and categories. Each of the three drawings was scored based on points awarded for the number of items (specific characteristics of the drawing) correctly completed. The points are awarded on 14 criteria. Of these criteria, 12 are parts of the body, namely: Arms, Ears, Eyes, Feet, Fingers, Hair, Head, Legs, Mouth, Neck, Nose and Trunk. The remaining two criteria are placement of certain body parts in relation to each other and clothing. Each criterion can be met to varying degrees, based on the number of items correctly completed. For example, the items for the Arms criterion include the following: Arms presence, Arms detail 1, Arms detail 2, Arms proportion and Arms bonus.

> *'This organization allows for as few as three and as many as seven items organized according to the four categories for any one of the 14 criteria.'* [27, p25]

Within the 14 criteria, the items are organised into four categories:

- Presence - 13 of the criteria (all except Attachment) are scored for presence. A point is given if the drawing includes a particular body part or piece of clothing. This category represents the most basic way the subject may earn credit. It requires only the crudest type of representation.
- Detail - 12 criteria are scored for at least one detail. This score credits the elaboration of the criterion beyond a simple representation.
- Proportion - 10 criteria are scored for proportion. This score credits relatively realistic proportions of the body part.
- Bonus - for each of the 14 criteria, additional credit is given if all the applicable categories for that criterion are scored as correct. [27]

One point was given for each item which was correctly completed in the drawing, for a maximum drawing score of 64. This was then the raw score for the drawing. (Refer to Appendix H which contains a copy of the DAP Scoring System Sheet with the 64 items under the 14 criteria on which they are scored.)

In order to obtain the standard scores from the raw scores the following steps were performed:

- Subject's chronological age was calculated by subtracting the birth date from the testing date, assuming that a month has 30 days. Rounding up days to the nearest month did not occur as per the DAP manual instructions. [27]
- Raw scores were calculated for Man, Woman and Self drawings based on the above scoring system description. The DAP Record Forms were used for this purpose. (Refer to Appendix H for a copy.)
- Total raw score for each drawing was calculated by summing the raw scores on the Man, Woman and Self drawings.
- Total raw score for each drawing was converted to a standard score with a mean of 100 and a standard deviation of 15. This was performed by utilising the appropriate age columns in the tables in Appendix A of the DAP manual.
- Man, Woman and Self raw scores were converted to standard scores with a mean of 100 and a standard deviation of 15. The appropriate age columns in the tables in Appendix B of the manual were utilised for this purpose.
- There are no separate norms in the DAP for scoring the boys' and girls' drawings. [27]

3.5.5 PMP Administration, Data Collection and Recording at School A1

PMP equipment sessions are typically administered by a teacher with assistance from teacher aides and/or parent helpers. Usually only one class takes part in the half hour equipment session at a time. [2] The PMP equipment sessions at School A1 were conducted twice a week in the afternoons in this manner.

The class teachers kept a record of the attendance at PMP of each child in their class who was part of the study sample. It was intended that the class teachers would perform the prescribed evaluation of each child's performance at the equipment station that they were managing. This evaluation is part of the programme (Refer to pp 103-104 in Appendix B) and was to be performed by answering the yes/no question at the bottom of the corresponding activity card. An evaluation grid for this recording purpose is supplied by the PMP consultants. [15]

Unfortunately these evaluations were not consistently performed. Since the data was incomplete it could not be analysed. If all the data were to have been available this would have provided an indication on whether individual children could successfully perform the activities designated to improve body image. This information would then have been correlated to individual scores on the drawing of Self.

It was anticipated that the subjects would attend approximately 48 half hour equipment sessions during the six month period between the two DAP test administrations. In the second school term however, over a five week period, 10 sessions were lost due to problems with the venue. This break was unforeseen and unfortunate. It resulted in the experimental group

participating in 38 equipment sessions. Appendix C contains a brief description of the 41 activity stations that the subjects participated in during the 38 equipment sessions.

As per the PMP outline, six floor sessions were completed before any equipment sessions were begun. Further floor sessions were then completed, one for every two equipment sessions over the duration of the study. These floor sessions were taken by the class teachers and lasted on average between 20 to 30 minutes. They were conducted at various times as suited the three class teachers' teaching timetables.

School A1 did not conduct the language follow-up sessions. The teachers had not yet put this into place as this was their second year of running PMP.

3.6 Data Analysis

Demographic information on the children's age and gender was obtained and analysed. Descriptive data on the types of human figure drawings made by the children was extracted. Professor Piet Becker from the South African Medical Research Council assisted with the statistical analysis of the study data. Pre-test and post-test data from this within subject design, i.e. change in score from February to August, was analysed using an analysis of covariance (ANCOVA) to compare the two groups with respect to this change in score with the February score as covariate. Thus, the groups were compared with respect to mean change after adjusting for baseline i.e. the February score. These results were also confirmed using a nonparametric analysis of covariance making use of ranks. The latter analysis was done due to concern over the relatively small sample size and the large variations in the data.

The breakdown of the raw scores according to the four DAP categories of Presence, Detail, Proportion and Bonus was computed. The mean increase in the Total score for boys and girls was also calculated.

CHAPTER 4

4.0 RESULTS

4.1 Introduction

In order to determine whether participation in PMP had an effect on children's ability to draw human figure drawings, the DAP was administered as a pre-test and as a post-test to both experimental and control groups independently. A statistical analysis was conducted to assess whether participation in PMP resulted in higher scores on the DAP test.

4.2 Sample Demographics

There were eight girls and six boys in the experimental group and nine boys and six girls in the control group. During the course of the study, one child from the control group moved out of the area. Therefore the final composition of the control group was 14 children, eight boys and six girls.

The following table describes the study sample by gender and average age at the post-test administration of the DAP in August:

Table 4.2 Composition of Study Sample by Gender and Age at Post-test

Characteristic	**Control Group (School A2)**	**Experimental Group (School A1)**
Gender	8 males 6 females	6 males 8 females
Average age in August	5 years 8 months	5 years 9 months

4.3 Study Results

The research question investigated whether there was a significant quantitative difference with respect to the mean change (increase) in DAP standard scores between the two groups. The results of this study were analysed in terms of improvements in standard scores (with a mean of 100 and standard deviation of 15) made by each group respectively. Scores of the drawing of Self were analysed separately from the Total scores (sum of the Man, Woman and Self scores). An additional analysis of the raw scores for the drawing of Self and Total scores was also performed. This was necessary as the DAP has not been standardised on the New Zealand population.

Table 4.3.1 below reports the following data for both the control and experimental group - means and standard deviations for the pre-test and post-test standard scores and that of the change in these scores computed as pre-test score minus post-test score. Also given are the p-values associated with the comparison of the two groups with respect to change using an ANCOVA (parametric and nonparametric) with the baseline score (pre-test score) as covariate. The nonparametric p-values appear in brackets next to the p-values from the initial parametric analysis.

Table 4.3.1 Means, Standard Deviations and P-values Using Standard Scores: Control versus Experimental Group Performance on the DAP

Variable	Control Group Mean	Control Group Std. Dev.	Exp. Group Mean	Exp. Group Std. Dev.	P-value
Ss1	93.5	11.26	93.14	9.91	N/A
Ts1	93	12.53	92.71	11.81	N/A
Ss2	103.64	13.99	95.86	8.42	N/A
Ts2	101.86	14.37	96.79	10.79	N/A
Ss12	-10.14	12.04	-2.71	9.57	0.0570(0.0565)
Ts12	-8.86	9.98	-4.07	12.16	0.2228(0.1990)

Key: Ss = std. score on drawing of Self; Ts = total std. score of Man, Woman and Self drawings; 1= pre-test; 2 = post-test; 12 = pre-test minus post-test

Both the control group's and experimental group's scores increased from the pre-test to the post-test. For both post-test standard scores, namely the Self standard score and Total standard score, it was observed that the control group's scores were higher than the experimental group's scores. Therefore the control group from School A2 improved more than the experimental group from School A1.

From the ANCOVA which compared the control group scores with the experimental group scores it was found that, when adjusting for baseline, the improvement in the control group scores was not significantly better than the experimental group's improvement (Self standard score: p=0.0570; Total standard score: p=0.2228).

The conclusion of the nonparametric analysis, performed due to the relatively small sample size and the large variations in the data, was very similar to the initial parametric analysis above (Self standard score: p=0.0565; Total standard score: p=0.1990).

The difference between the groups' raw Self scores and raw Total scores were also calculated using an ANCOVA. The p-values obtained from the raw scores were similar to the p-values derived from the standard scores (Self raw score: p=0.0619; Total raw score: p=0.2283).

In order to provide further insight into the above results, the children's raw scores on the DAP were analysed according to the four categories in the DAP scoring system. These four categories are Presence, Detail (including Attachment), Proportion and Bonus. Table 4.3.2 below illustrates how the children's raw scores increased from the pre-test to the post-test in each of these four categories for the Self scores and the Total scores. The table highlights the difference between the control group's and the experimental group's increases per category.

Table 4.3.2 Increase in Raw Scores from Pre-test to Post-test per Category on the DAP

	Presence		**Detail**		**Proportion**		**Bonus**	
	Control	**Exp.**	**Control**	**Exp.**	**Control**	**Exp.**	**Control**	**Exp.**
Sr21	21	0	65	31	29	26	18	9
Difference	21	-	34	-	3	-	9	-
Tr21	58	19	146	100	86	74	53	39
Difference	39	-	46	-	12	-	14	-

Key: Sr = raw score on drawing of Self; Tr = total raw score of Man, Woman and Self drawings; 21= post-test minus pre-test; Difference = control group's score increase minus the experimental group's score increase

When comparing the raw scores on the post-test with those on the pre-test, the children in the control group added more items in all four categories than the children in the experimental group. The largest difference in score increases occurred in the first two categories of Presence and Detail. These two categories together account for 82% of the difference in increases of raw scores for the Self drawing and for 77% of the difference in the increases of raw scores for the Total drawing score. The Proportion and Bonus categories account for only a small portion of the difference between the two groups' raw score increases.

In order to establish whether the ratio of boys to girls in the study sample influenced the results in any way, the mean increase from pre-test to post-test using the Total standard scores was calculated. Table 4.3.3 illustrates that in both the experimental and the control group, the mean increase from the pre-test to the post-test was higher for boys than for the girls. This difference between the boys and girls was much larger in the experimental group than in the control group. As the number of boys and girls were very similar in both groups, the difference in scores between the genders did not significantly influence the study results.

Table 4.3.3 Mean Increase and Standard Deviation of Total Standard Scores for Boys and Girls

	Boys			**Girls**		
	Number	**Mean**	**Std. Dev.**	**Number**	**Mean**	**Std. Dev.**
Control	8	9.5	9.15	6	7.5	12
Experimental	6	9.17	14.13	8	0.25	9.63

In keeping with the results from the reviewed literature, the following findings were noted. On examination of the 168 human figure drawings from both groups combined, all of the drawings were in frontal view. The influence of age was also observed in the kinds of human figure drawings produced by the children in each group, namely tadpole, transitional and conventional forms. Table 4.3.4 summarises these drawing developments during the pre-test to post-test period.

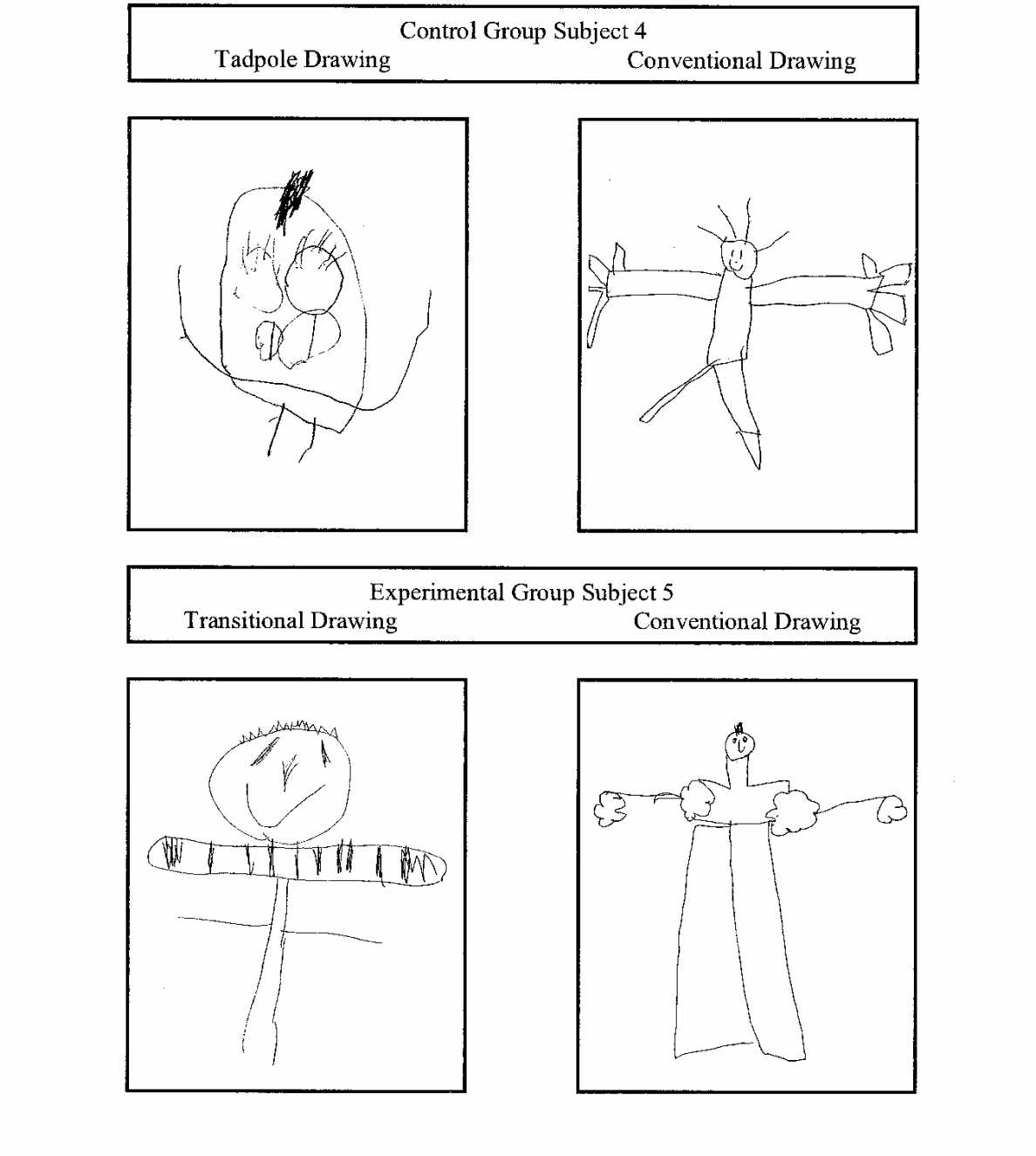
Table 4.3.4 Numbers of Children in Control and Experimental Groups who Produced Each of the Different Types of Human Figure Drawings

	Control Group		**Experimental Group**	
	Pre-test	**Post-test**	**Pre-test**	**Post-test**
Tadpole	3	2	2	0
Transitional	0	0	1	0
Conventional	11	12	11	14

Examples of tadpole, transitional and conventional human figure drawings are provided in Figure 4.3.1 below. These Self drawings were selected to illustrate the drawing development of one child from the control group and another child from the experimental group from the pre-test to the post-test.

Figure 4.3.1 Examples of Pre-test and Post-test Self Drawings from the Control and Experimental Groups

Pre-test **Post-test**



In summary, the results of the statistical analyses showed that participation in PMP did not have a significant effect on enhancing a child's drawing of a man, woman and self. These analyses negatively answer the research question which enquired whether there would be a significant quantitative difference in five year old New Zealand children's drawings of a person, including of themselves, after six months of participation in PMP, as compared to a similar control group that did not participate in PMP.

CHAPTER 5

5.0 DISCUSSION

5.1 Introduction

The results of this study are discussed with reference to literature from similar studies. The influences of age, gender, ethnicity and schooling are described. Confounding variables which influenced the results are described under study limitations. The confounding variables include sample size, differences between groups, PMP administration and duration and DAP administration. Concern with the theory underlying PMP is discussed along with a criticism of the programme.

5.2 Discussion of the Results

Due to the experimental group's participation in PMP it was anticipated that these children's human figure drawing scores would be significantly greater than those of the children who did not participate in PMP. Following the specific movement opportunities afforded by the PMP equipment and floor sessions directed at increasing awareness of the body structure and movement possibilities, it was expected that these children would draw human figures with more body parts and greater details. The children, who participated in PMP however, did not perform better on the human figure drawing task than the children in the control group.

An analysis of the increase in raw scores from pre-test to post-test per category on the DAP showed that the experimental group did not increase in score in the Presence of body parts category for the Self drawing. (Refer to Table 4.3.2.) The improvement in the Presence of body parts category for the Total drawing scores was 19 points. The experimental group's

increase in raw scores on the Detail and Proportion categories ranged between 26 to 100 points.

In the literature [4, 5, 68] it is reported that consciously moving body parts in a purposeful manner and judging spatial relations with external objects is important in improving body image. Children's knowledge and awareness of their bodies, their body image, can be measured by their drawings of people. [3, 68] Humphrey [4] and Mott [7] reported an increase in the details on children's human figure drawings produced immediately after specific movement activities accompanied by verbalisation of the moving body part. In this study, the DAP was not administered immediately after the floor or equipment sessions. Memory [69] can influence children's performance on human figure drawing tasks. In Humphrey's and Mott's studies the children would have had an advantage performing the drawing task immediately after the movement activities.

Parush and Hahn-Markowitz [3] reported a significant increase in five year old children's human figure drawings following their participation in a perceptual-motor programme for one and a half hours a week over seven months. The equipment in their gross motor programme appears similar to the PMP equipment apart from their use of swings, bolsters, slides, a sandbox and a trampoline. Parush and Hahn-Markowitz utilised climbing, crawling and balance activities similar to PMP equipment session activities. The differences between Parush and Hahn-Markowitz's study and this study include: children with identified perceptual motor dysfunction versus typically developing children in PMP; 28 weeks versus 19 weeks in PMP; programme developed and implemented by occupational therapists versus PMP developed by teachers and administered by teachers and teacher aides/parent volunteers. The differences

between Parush and Hahn-Markowitz's study and this study could account for the different human figure drawing results. Factors including programme length, development and administration are discussed in depth later in this chapter.

Culp et al [6] found that ten hours of sensorimotor training over a one month period can significantly improve typically developing preschool children's body awareness as reflected in their drawings of a person. The children's drawings displayed increased body parts from the pre-test to post-test. The main differences between Culp et al's study and this study are: the mean age of the children namely, four years three months versus five years three months in PMP; the inclusion of yoga, tumbling on mats and relaxation/breathing exercises in Culp's programme.

Williams comments that the age of children can influence the effectiveness of perceptual motor training outcomes. [21] There is a decreasing relationship between perceptual and cognitive behaviours with increasing age. Yoga and relaxation techniques make use of imagery which is required for the human figure drawing task. [67, 78, 79] The specific vestibular input provided by the tumbling on the mats is likely to have provided heightened bodily sensory awareness. [62] The processing of body sensations play a role in the development and improvement of body image. [35, 54, 62]

The results of this current study are comparable to the findings in Farr and Leibowitz's study [46] where 20 kindergarten children from low socio-economic backgrounds participated in a daily eight week perceptual motor programme. Although there was an increase in the human figure drawing scores from the pre-test to post-test, this increase was not significant. The mean

increase for the total drawing scores ranged from 6.5 to 10.3 points in the experimental groups. The mean increase in this current study's experimental group for the Total DAP score was 4.08 points. The children in Farr and Leibowitz's study participated in 40 hours of perceptual motor training over a two month period in comparison to the children in PMP who had approximately 28 hours of intervention over a six month timeframe.

5.3 Influences of Age, Gender, Ethnicity and Schooling

5.3.1 Influence of Age

The group mean for the Total standard score of the children who took part in PMP increased by 4.08 points from the February to the August administration of the DAP. The mean increase from DAP pre-test to post-test for the Self standard score for this group was 2.72 points. The mean increase for the Total and Self standard scores of the children in the control group was 8.86 and 10.14 points respectively. (Refer to Table 4.3.1.) This finding that the human figure drawing scores of both groups of children improved over time was to be expected. In the literature [85, 86] it is consistently documented that as children increase in age their drawings of people become more detailed resulting in increased scores on human figure drawings tests. [13, 16, 27]

The influence of maturation was also observed in the developmental progression of the types of human figure drawings produced by the children in both groups. [85] Over the duration of the study, two children from the experimental group and one child from the control group changed from drawing immature tadpole human figure drawings to mature conventional figure drawings. One child in the experimental group produced transitional human figure drawings at the pre-test and conventional human figure drawings at the post-test. In this study all the

children's drawings were in the frontal view which is typical of five year olds' drawings of people. [16, 85]

5.3.2 Influence of Gender

According to studies, the difference in drawing scores between boys and girls as measured by the DAP is not significant. [27, 89, 91] No separate norms for boys and girls are provided in the DAP manual. [27]

In this study the experimental group had six boys and eight girls, and the control group had eight boys and six girls. In both groups the boys' mean Total standard scores increased more the girls'. (Refer to Table 4.3.3.) Thus the gender composition affected how well the groups performed on the DAP in relation to each other. Having more boys than girls would have been an advantage to the control group in terms of the mean score increases, and having fewer boys than girls would have been a disadvantage for the experimental group. This is especially true for the experimental group in which the boys scored substantially higher than the girls. This difference in gender composition between the two groups is however not statistically significant. The control group's scores remain higher than the experimental group's scores even after adjusting the scores to compensate for this difference.

5.3.3 The Influence of Ethnicity

According to the literature, the DAP and similar human figure drawing tests that rely on the progression of observed developmental stages can be meaningfully used in Western cultures such as New Zealand as the measured developmental stages are known to occur there. [85] In

1932 Paget found that 61% of the human figure drawings produced by five year old Maori children were drawn in profile. [85, 88]

In this study the children's drawings were all in the frontal view and displayed the conventional Western type of figure drawings, namely either tadpole, transitional or conventional forms. [85, 87] During the administration of the DAP the researcher observed that approximately half of the children in the control group appeared to belong to the Maori ethnic group. In the experimental group this representation appeared to be lower. Human figure drawing studies [75, 90] have shown that if age and socio-economic variables are controlled for, ethnic differences if present are insignificant. Within this study the age of the children was controlled for along with the socio-economic level as the children from both groups belonged to low socio-economic decile two schools. (Refer to Appendix D for information on the school decile.)

5.3.4 The Influence of Schooling

Studies have shown that exposure to schooling can influence human figure drawing ability. [85, 87] Schooling provides opportunities to draw with increasing proficiency and aids in the development of related cognitive skills such as categorisation, analysis and synthesis. [87] The influence of schooling was controlled for in this study in that the children from both groups had very similar amounts of time in school, having begun primary school at age five. The mean ages for the control and experimental group differed by one month with the mean age of the children in the experimental group being five years three months in February, one month older than the children in the control group.

5.4 Study Limitations

5.4.1 Sample Size

A limitation of this study is the sample size of 14 children in both the experimental and the control groups together with the large standard deviations for both groups. (Refer to Table 4.3.1.) Using the means and standard deviations from this study, the statistician performed a power analysis using the two-sample t-test. The statistical power was found to be poor at 0.3058 due to the high variability in this study sample. In order to have obtained an estimated power value of 0.8 based on the Total standard scores of this study, there would need to have been 67 children in each group. It was not possible to obtain a larger sample size given the size of the schools in Rotorua and in the nearby towns. A significant difference in performance on the DAP was not found between the two groups. A possible cause of this could have been insufficient statistical power, influenced by the sample size. A larger sample size would have yielded more reliable results.

Farr and Leibowitz's sample consisted of 20 children divided into two groups of 10 for both phases of the study. [46] They did not find a significant difference between the human figure drawing test scores after perceptual motor training when compared to the control group's drawing scores. Culp et al had a study sample of 24 with three groups of eight children. [6] They found a significant difference in the children's human figure drawing scores in both the sensorimotor and cognitive-perceptual training groups. As the sample from this study is comparable in size to the above study samples, it is likely that additional factors also influenced this study's results.

5.4.2 Differences between Control and Experimental Groups

The control group was matched as closely as possible to the experimental group using the decile ranking system and the recommendations by School A1's principal. Despite this however, differences between the groups did exist and were likely to have influenced the results. During the administration of the pre-and post-tests, the researcher observed differences in teaching methods and classroom management of the children within the samples from the two schools.

School A2, from which the control group was obtained, appeared to have a more structured teaching approach. One teacher mentioned teaching her class how to draw people, focusing on the inclusion of certain basic body parts. This may have given the children from this class at School A2 an advantage in terms of inclusion of details in their drawings during the post-test administration. When the breakdown of the increase in raw scores from the initial to final administration of the DAP was analysed, it was apparent that the main difference between the experimental and control groups was in the Presence and Detail categories. (Refer to Table 4.3.2.)

Goodenough reported on a study where direct coaching on human figure drawing according to the Goodenough Draw-a-Man scoring system was given to a first grade class. [16] Prior to the coaching a control drawing of a man was obtained from each of the children. On the following two days a 30 minute period was spent on coaching the drawing by a teacher who had considerable experience in administering and scoring the drawing test. The teacher coached the children by illustrating the drawing method on the blackboard, dictating instructions to them as they made their drawings and pointing out individual errors in the drawings. In the

afternoon of the second day of coaching, the human figure drawing test was administered in the usual way and re-administered again one week later. When comparing the control drawing with the final drawing, 70 percent of the children had gained at least one point, eight percent had neither a gain nor loss and 22 percent showed a slight loss.

It would appear that in the majority of cases, specific training in drawing the human figure can slightly increase the test scores. Although the teacher at School A2 would not have taught the children according to the DAP scoring criteria, it is possible that her instruction could have contributed to the children in the control group scoring higher than those in the experimental group. A limitation of using a human figure drawing test as an outcome of PMP is that the drawing of a person is a familiar and common task in the educational setting. [76]

During the pre-test administration when the children from the control group were performing the drawings, they were expected to remain quiet for the entire duration of the procedure. This was actively enforced by the teachers present. The teachers of the experimental group at School A1 however, did not insist on complete silence and generally allowed more classroom noise in keeping with a more co-operative learning style. For the post-test administration, the control and experimental groups were assessed as whole groups in rooms next to the halls. The children, especially those from the experimental group, appeared slightly more excitable in this type of setting. Wilson and Kaplan in their study attributed the variability of some subjects' scores to behaviour rather than to the actual skill being measured. [51] This could be applicable to this study, especially to the children in the experimental group.

A final difference between the control and experimental groups' scores on the DAP is the nature of the movement opportunities that were available to the children. The children in the control group, while not having access to PMP floor and equipment sessions, did participate in their regular physical education lessons three times a week for 45 minutes. They had swimming lessons for the first 10 weeks and then running/fitness and ball skills. In addition these children participated in half hourly Kapa Haka sessions three times a week for six weeks. These sessions consisted of group singing, dancing and movement. These activities could have had a greater impact on the control group's drawings than the PMP intervention.

Some schools have replaced traditional physical education programmes with perceptual motor programmes for their younger students. [52] Campbell commented that physical education activities can be considered to be perceptual motor in origin. [52] Further more promoters of perceptual motor programmes are yet to show evidence that the activities in these programmes are unique or more effective than physical education programmes in improving children's fundamental movement and concept acquisition. [52]

5.4.3 PMP Implementation

Cratty wrote that in order to elicit changes in motor function in children, close supervision and good instruction should be applied by professionals possessing appropriate educational backgrounds. [48] Cratty also commented that the programmes investigated in Kavale and Mattson's meta-analysis [36] were conducted by individuals with little or no background in motor development. [48]

Litterick-Biggs and Broadley in their study on the implementation, management and evaluation of PMP, found that participant teachers had

> *'very little knowledge of the programme before implementation.'* [32, p23]

In their study teacher training on PMP consisted of a one day seminar. Parent help was rated by the participant teachers as the most important factor in managing the programme. Teachers expressed that it was difficult to recruit and retain helpers. [32]

In this study PMP was overseen by teachers and run with the assistance of helpers namely, teacher aides and parent volunteers. The teacher aides and parents were not given any practical training on how to administer the activities at the equipment sessions. The school management were unwilling to invest in an additional training expense required to compensate the teacher aides for their time or to put further demands on the parent volunteers. They believed that the programme had gone well the previous year and that the initial one day teacher training by the New Zealand PMP consultant was sufficient. The school reasoned that most of the teacher aides knew the programme from the year before. The helpers had access to the 11 page helper training guide in the PMP manual which describes the correct movement patterns and techniques for the floor and equipment sessions. [2] The helpers were expected to follow the directions on the activity cards and any incidental instruction by the teacher in charge.

With teacher aides and volunteer parents supervising many of the equipment activity stations, their ability to facilitate the acquisition of the children's fundamental movement skills can be questioned. [52] According to the literature quality instruction is a critical element in contributing to fundamental movement skill improvement. [20, 48, 52]

The language follow up activity sessions of PMP were not implemented by the school as this was their second year of running the programme and this component had not been put into place. The language activity sheets in these sessions are designed to reinforce the language concepts covered in the equipment sessions and occur for five to ten minutes in the classroom as a whole group immediately following each equipment session. The language follow up activities require the children to write and draw about their experiences in the PMP equipment sessions. [2]

On analysis of the language concepts [101] that would have been covered with the corresponding equipment sessions, the researcher found that the majority of the language concepts were prepositions and adjectives with a few nouns and verbs. No parts of the body were emphasised as the language concepts related primarily to spatial concepts such as on/off, over/under and up/down and descriptors such as big/little and first/last.

Bulluss reported that children's body image as assessed by the human figure drawing test is only developed when language is utilised in conjunction with the specific movement of named body parts. [34] This is designed to occur during the movement to music in the floor sessions and during the equipment sessions when the helpers are required to talk to the children as they perform the specific activities and movement patterns. [2, 34] The floor sessions in particular are viewed as being the most effective in linking movement experiences to body image development. [34] In view of these comments and the findings of Humphrey [4]and Mott [7] the omission of the language follow up sessions is not likely to have had a significant effect on this study's results.

5.4.4 PMP Duration

It was anticipated that the children would participate in 48 half hour equipment sessions and 24 twenty to thirty minute floor sessions during the six month period. In the second school term however, over a five week period, 10 equipment sessions were lost due to problems with the venue. Thus the experimental group participated in PMP for a total of 19 weeks. According to the findings from Kavale and Mattson's meta-analysis perceptual motor programmes of this length have been found to be ineffective in increasing academic, cognitive or perceptual motor variables. [36] Therefore the number of sessions of PMP may have been insufficient to make a significant difference in favour of PMP enhancing children's human figure drawings.

Hagood commented on the limitations of conducting research in the school environment. [89] In this study the loss of the hall as a venue for the equipment sessions and the school's unwillingness to train the helpers were beyond the researcher's control.

5.4.5 DAP Administration

At Schools A1 and A2, during both pre-test and post-test administrations of the DAP, the researcher noticed the close proximity of the children to one another and the potential for copying one another's drawings. One teacher from School A2, after the testing, mentioned this to the researcher as a concern. Children learn drawing techniques from their peers [87] and being able to see each other's work may have confounded the scores by inflating the group means, possibly more for the control than the experimental group.

5.5 Criticisms of PMP

5.5.1 Theoretical Basis

PMP's theoretical basis is from the work of theorists mainly from the 1960's and 70's namely, Kephart, Montessori, Ayres, Doman and Delacato and Capon. [1] It is also based on the work of Cratty, Arnheim and Sinclair and the 'task analysis' psychologists. [2] While the authors claim that the programme is specifically designed for *'today's students'*, [1, p1] there is no evidence that findings from recent research have been incorporated into the programme's theoretical basis and activity components. For example, no scientific rationale [32] is provided to explain the PMP Outcomes Model (Refer to Figure 2.2.2.) or how certain activities in the equipment sessions are categorised as enhancing body image. (Refer to asterisks next to Station Name in Table C in Appendix C.)

As early as the 1970's there have been concerns raised as to the

> *'theoretical and empirical foundations of perceptual motor training programs.'* [36, p165]

Specifically there are study findings that cast doubt on the effectiveness of Delacato [38, 50] and the Kephart-type [38] programmes. If some of the theory behind PMP is outdated and possibly weak, then it is likely that this would have impacted adversely on this study's findings.

5.5.2 PMP Structure

The researcher observed that the children's physical activity levels were low during some of the equipment sessions. For example, the children spent valuable time waiting in line for a turn on selected pieces of equipment. Children must be active participants in order to improve their body image and moment skills. [3, 21, 52] It is reasonable to expect that children will learn more when they are actively involved for longer periods. [52] It is possible that the children in

the control group may have had higher rates of physical activity participating in the swimming and running/fitness activities.

5.6 Discussion Summary

Due to this study's relatively small sample size and the large variability of the data within the groups, it is not possible to draw a definitive conclusion about the effect of PMP equipment and floor sessions on the children's human figure drawings. Factors including the theoretical knowledge and skill of the programme developers are important in intervention efficacy. Within the reviewed literature, the movement interventions developed by professionals such as occupational therapists, were shown to have a significant effect on the participants' human figure drawings. [3, 6] The effectiveness of the PMP equipment sessions may have been somewhat reduced by the utilisation of unskilled helpers. According to the literature, children are most likely to benefit from quality instruction delivered by appropriate professionals. [20, 48, 52] The number of sessions of PMP is likely to have been insufficient to make a significant impact on the children's body image as reflected in their drawings of a person. [4, 36]

In comparison the control group scored marginally higher on the DAP, particularly in the Presence and Detail categories, than the experimental group. The children in the control group appeared to benefit from incidental classroom instruction in the drawing of the human figure. [16] In addition, the control group participated in regular physical education, group movement and dance lessons. These lessons may have provided the control group with more significant perceptual motor experiences particularly if they were structured to facilitate high activity levels and rates of participation. [52]

CHAPTER 6

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Summary of Findings

This study examined the effectiveness of the Smart Start with Perceptual Motor Program (PMP) on enhancing the ability of five year old New Zealand children to draw pictures of a person - a man, woman and themselves.

A quasi-experimental research design with purposeful sampling was utilised. The 14 children in the experimental group were from School A1, a low socio-economic decile two school in Rotorua, New Zealand. These children participated in 38 half hour equipment sessions and approximately 19 twenty to thirty minute preparatory floor sessions of PMP from February to August. The control group was from School A2, also a low socio-economic decile two school in Rotorua. The control group consisted of 14 children who did not participate in PMP. Both groups of children drew three pictures of a person, a Man, Woman and Self, using The Draw A Person: A Quantitative Scoring System (DAP) assessment tool. The DAP was administered at both schools prior to the experimental group's commencement in PMP as a pre-test and again six months later as a post-test.

The Self raw scores and Total (sum of the Man, Woman and Self) raw scores on the DAP were converted to standard scores. The change in these standard scores from February to August was analysed using an analysis of covariance (ANCOVA) to compare the two groups with the February scores as the baseline. A significant difference was not found between the scores of the experimental and control groups. The p-values from the ANCOVA were Self standard score: $p=0.0570$ and Total standard score: $p=0.2283$. These results were also

confirmed using a nonparametric analysis of covariance making use of ranks. The results of the latter were very similar to the initial parametric analysis (Self standard score: p=0.0565; Total standard score: p=0.1990). The results from the analysis of the difference between the groups' raw Self and raw Total scores supported the above standard score findings.

Upon examination of the increase in the raw scores in the four categories of the DAP from the February to August administrations, the control group added more items in each category. This was particularly evident in the Presence and Detail categories. The experimental group made smaller increases per category, except in the Presence category of the Self drawing where no increase from the pre-test to the post-test was evident.

6.2 Conclusion

The purpose of this study was to examine the effectiveness of the Smart Start with Perceptual Motor Program (PMP) on enhancing the ability of five year old New Zealand children to draw pictures of a person - a man, woman and themselves. The standardised Draw A Person: A Quantitative Scoring System (DAP) by Naglieri was used to score the children's drawings.

It was investigated whether there would be a significant quantitative difference in five year old New Zealand children's drawings of a person, including of themselves, after participating in PMP over a six month period, as compared to a similar control group that did not participate in PMP. It was found that there was no significant, quantitative difference based on the results of the statistical analysis of covariance (ANCOVA). It would therefore appear that PMP does not have an effect on enhancing the ability of five year old New Zealand children to draw pictures of a person, including of themselves.

The results of this study however, should be interpreted cautiously in the light of the previously discussed study limitations namely: relatively small sample size (14 in both experimental and control group); differences in experimental and control groups (teaching methods, classroom management); implementation of PMP (training and use of helpers); short duration of PMP (19 weeks); and DAP administration (group administration and copying).

Therefore, due to the above study limitations, the researcher concludes that it is not possible to make reliable inferences to the population. Thus, in order to determine the effectiveness of PMP on enhancing five year old New Zealand children's ability to draw pictures of people, more data utilising a larger and broader sampling regime would need to be gathered in future studies. Future studies should take into account the recommended methodological revisions described below.

6.3 Recommendations

6.3.1 Revisions of the Methodology

In order to further investigate the effectiveness of PMP on enhancing children's ability to draw pictures of people, it would be advisable to make the following changes to this study's methodology.

The results from the post-hoc power analysis conducted by the statistician determined that the future sample size should be 67 children in each group. In order to obtain a sample of this size, the study would need to be conducted in a larger town than Rotorua. Suitable schools from which to draw the sample would need to be anticipating a large enrolment of five year old children.

In order to reduce the influence of the confounding variables involving the differences between the control and experimental groups, the following option could be considered - obtaining both control and experimental groups from a large school conducting PMP and randomly assigning half of the children from each class to participate in PMP. The children from the other half of each class would participate in regular physical education lessons. In practice, this has ethical implications [10, 51] as it would mean that children from the remaining half would not have the opportunity to participate in PMP.

To control for the confounding influence of teachers training the children how to draw human figures, [16] the teachers would need to agree to adhere to certain guidelines beforehand.

Comprehensive practical training of the helpers on the administration of PMP would aid in ensuring the instruction of the correct techniques in the floor and equipment sessions. [20, 48, 52] The expense of additional training would need to be budgeted on and the necessary funding resourced.

It would be advisable to conduct the study over a longer time period to allow the experimental group to participate in more sessions of PMP. There is a lack of longitudinal studies on the effect of PMP and other perceptual motor programmes. [1, 36] Bulluss and Coles believe in perceptual motor programmes of longer duration [1] and have designed resources with equipment sessions for the first three years of schooling. [2]

In order to control for the children copying each other's work, the DAP could be administered individually. [6, 27, 87] Young children new to school could however become anxious if required

to work with a stranger and this could adversely affect their performance. A more suitable option may be to administer the DAP in a large enough venue so as to seat the children individually well away from one another.

6.3.2 Directions for Future Research

Bulluss and Coles provide the drawing of a person as the PMP outcome measure for the improvement in children's body image. [2] From the literature it is evident that other measures are also available. [5, 24, 68] For example, Woodburn and Mendez in 1988 developed a Spanish body image test based on Cratty's 1970 body image scale. [68] Their body image test utilised verbal and movement responses. Future studies could use the DAP together with other measures of body image when examining the effectiveness of PMP.

In order to fully investigate informal claims [33, 34] attesting to the effectiveness of PMP, a more comprehensive investigation could be undertaken. Future studies could examine the effect of PMP floor, equipment and language sessions on improving academic skill acquisition, self-esteem and motor skills. Pupil and teacher perceptions of the effectiveness of PMP could be investigated using qualitative research methods.

The criticisms directed towards PMP's theoretical basis [32, 38, 50] and programme structure [21, 52] are likely to also impact upon future studies. The empirical evidence of Kavale and Mattson's meta-analysis on the efficacy of perceptual motor training does not provide support for perceptual motor programmes in general. [36] Therefore a thorough examination of the theoretical basis on which the activities in PMP are based is warranted. Relevant up to date research from the field of the allied heath sciences, paediatrics and child development, human

movement sciences and the neurosciences should be critically evaluated. This would also serve to provide the basis and evidence for future perceptual motor programme development and possible revisions to PMP.

To conclude, future studies should evaluate PMP participants' progress both quantitatively and qualitatively. The type of evaluation measures should incorporate more information than the criterion reference skill grid supplied by Bulluss and Coles. [2] Qualitative evaluations would also be necessary to document progress along a continuum. [32] Ultimately this would ensure that the PMP activities were best designed to meet individual children's needs. Comprehensive evaluation measures would provide information on PMP strengths and shortcomings. [32, 52] These evaluations would provide the necessary data on the efficacy of PMP. This would inform decisions as to whether Smart Start with Perceptual Motor Program should be a part of the school curriculum in the junior year levels and whether government funding should be allocated to this programme. [31, 52]

REFERENCES

1. Bulluss, J. <info@smartstarters.com.au > *Re: Request for Information Around PMP.* Personal e-mail. [accessed 1 February 2004].

2. Bulluss, J. & Coles, P. *A Perceptual Motor Program: A Manual for Teachers.* Third Edition. Victoria, Australia: P.J. Developments: 1998.

3. Parush, S. & Hahn-Markowitz, J. *A Comparison of Two Settings for Group Treatment in Promoting Perceptual Motor Function of Learning Disabled Children.* Physical and Occupational Therapy in Pediatrics 1997; 17:1.

4. Humphrey, J.H. *Motor Learning in Childhood Education.* Illinois, USA: Charles C Thomas Publisher: 1992.

5. Cratty, B.J. *Perceptual Motor Efficiency in Children.* Philadelphia, USA: Lea & Febiger: 1969.

6. Culp, R.E., Packard, V.N. & Humphry, R. *Sensorimotor versus Cognitive-Perceptual Training Effects on the Body Concept of Preschoolers.* The American Journal of Occupational Therapy 1980; 34:4.

7. Mott, S.M. *Muscular Activity an Aid in Concept Formation.* Child Development. 1945; 16.

8. Swee Hong, C. *Occupational Therapy for Children with Perceptual Motor Disorders: A Literature Review.* Occupational Therapy 1984; 2.

9. Platzer, W.S. *Effect of Perceptual Motor Training on Gross-Motor Skill and Self-Concept of Young Children.* The American Journal of Occupational Therapy 1976; 30:7.

10. Davidson, T. & Williams, B. *Occupational Therapy for Children with Developmental Coordination Disorder: A Study of the Effectiveness of a Combined Sensory Integration and Perceptual Motor Intervention.* British Journal of Occupational Therapy 2000; 63:10.

11. Flanagan, R. & Motta, R.W. *Figure Drawings: A Popular Method.* Psychology in the Schools 2007; 44:3.

12. Mei-Jin, C. *Validating the Draw-A-Man Test as a Personal Neglect Test.* The American Journal of Occupational Therapy 2000; 54:4.

13. Harris, D.B. *Children's Drawings as Measures of Intellectual Maturity.* New York, USA: Harcourt, Brace and World, Inc.: 1963.

14. Painter, G. *The Effect of a Rhythmic and Sensory Motor Program on Perceptual Motor Spatial Abilities of Kindergarten Children.* Exceptional Child 1966; 33.

15. Connell, J. *An Introduction to Perceptual Motor Programming* [workshop]. Hamilton, New Zealand, 10 June 2003.

16. Goodenough, F.L. *Measurement of Intelligence by Drawings.* Chicago, USA: World Book Company: 1926.

17. Capon, J. *Perceptual-Motor Lesson Plans, Level-2.* Third Edition. California, USA: Front Row Experience: 1983.

18. Sherborne, V. *Developmental Movement for Children: Mainstream, Special Needs, and Preschool.* Cambridge, UK: Cambridge University Press: 1990.

19. Rintala, P., Pienimäki, K., Ahonen, T., Cantell, M. & Kooistra, L. *The Effects of a Psychomotor Training Programme on Motor Skill Development in Children with Developmental Language Disorders.* Human Movement Sciences 1998; 17.

20. Gallahue, D.L. & Ozmun, J.C. *Understanding Motor Development: Infants, Children, Adolescents, Adults.* Fifth Edition. New York, USA: McGraw-Hill: 2002.

21. Williams, H.G. *Perceptual and Motor Development.* Englewood Cliffs, USA: Prentice-Hall, Inc.: 1983.

22. Matthew, P.S. *A Descriptive Study of the Body Use Enculturation of Typically Developing First Graders in the School Environment.* [dissertation] New Mexico, USA: Univ. of New Mexico, 1999.

23. Numminen, P., Nevala, N., Pennanen, M. & Sääkslahti, A. *Human Figure Drawing as a Representative Medium of Perceptual Motor Development among 3-to 5-Year-Old Children.* Paper presented at the Biennial Meeting of the International Society for the Study of Behavioural Development; 1996 August 12-16; Quebec City, Quebec, Canada. Available from: ERIC Document Reproduction Service.

24. MacWhinney, K., Cermak, S.A. & Fisher, A. *Body Part Identification in 1-to 4-Year-Old Children.* The American Journal of Occupational Therapy 1987; 41:7.

25. Tanaka, C. & Sakuma, H. *Human Figure Drawing Size and Body Image in Preschool Children from a Self-Physique Perspective.* Perceptual and Motor Skills 2004; 99.

26. Clark, D.F. *Body Image and Motor Skills in Normal and Subnormal Subjects.* International Journal of Rehabilitation Research 1984; 7:2.

27. Naglieri, J.A. *Draw A Person: A Quantitative Scoring System Manual.* USA: Harcourt Brace Jovanovich, Inc: 1988.

28. Vinter, A. *How Meaning Modifies Drawing Behavior in Children.* Child Development 1999; 70:1.

29. Freeman, N.H. *Drawing: Public Instruments of Representation.* In C. Pratt & A.F. Gorton (Eds.), *Systems of Representations in Children.* Chichester, UK: Wiley & Sons: 1993.

30. Corrie, L. & Barratt-Pugh, C. *Perceptual-Motor Programmes Do Not Facilitate Development: Why Not Play?* Journal of Early Child Development and Care 1997; 22:1.

31. Stephenson, J., Carter, M. & Wheldall, K. *Still Jumping on the Balance Beam: Continued Use of Perceptual Motor Programs in Australian Schools.* Australian Journal of Education 2007; 51:1.

32. Litterick-Biggs, A. & Broadley, G. *Smart Start with PMP: Implementation, Management and Evaluation.* Teaching and Learning 2005; 2.

33. Craig, B. *The Reality Is…Perceptual Motor Programmes.* New Zealand Physical Educator 2001; 3.

34. Bulluss, J. <info@smartstarters.com.au > *Re: Questions from NZ PMP Researcher.* Personal e-mail. [accessed 12 June 2007].

35. Winnick, J.P. *Adapted Physical Education and Sport.* Champaign, USA: Human Kinetics: 2000.

36. Kavale, K.A. & Mattson, P.D. *'One Jumped Off the Balance Beam'; Meta-Analysis of Perceptual Motor Training.* Journal of Learning Disabilities 1983; 16:3.

37. New Zealand Ministry of Education. How the Decile is Calculated: 2003. <http://www.minedu.govt.nz> [accessed 19 December 2003].

38. Cratty, B.J. *Physical Expressions of Intelligence.* Englewood Cliffs, USA: Prentice-Hall: 1972.

39. Van der Meer, A.L.H. & Van der Weel, F.R. *Development of Perception in Action in Healthy and At-Risk Children.* Acta Paediatrica Supplement 1999; 429.

40. Kephart, N.C. *The Slow Learner in the Classroom.* Second Edition. Columbus, USA: Charles E. Merrill Publishing Company: 1971.

41. Bulluss, J. & Coles, P. *Starter Activity Cards.* Melbourne, Australia: P.J. Developments: 1994.

42. *The New Zealand Curriculum Draft for Consultation 2006.* Wellington, New Zealand: Learning Media Limited: 2006.

43. Donaldson, L. & Maurice, P. *The South Auckland Perceptual Motor Dysfunction Survey* [research report]. New Zealand: Univ. of Waikato, 1983.

44. Barlow, B. *Perceptual Motor Activities in the Treatment of Severe Reading Disability.* The Reading Teacher 1971; 24.

45. Hedges, W.D. & Hardin, V.B. *Effects of a Perceptual Motor Program on Achievement of First Graders.* Educational Leadership Research Supplement 1972; December.

46. Farr J. & Leibowitz H.W. *An Experimental Study of the Efficacy of Perceptual-Motor Training.* American Journal of Optometry and Physiological Optics 1976: 53:9, Part 1.

47. Case-Smith, J., Allen, A.S. & Pratt, P.N. *Occupational Therapy for Children.* Third Edition. St Louis, USA: Mosby-Year Book, Inc: 1996.

48. Cratty, B.J. *Clumsy Child Syndromes: Descriptions, Evaluation and Remediation.* Chur, Switzerland: Harwood Academic Publishers: 1994.

49. Attention Deficit Hyperactivity Disorder - Educational Management: 2001. <http://www.health.govt.au/nhmrc/publications/adhd/part23.htm> [accessed 5 March 2004].

50. Kavale, K.A. & Forness, S.R. *Efficacy of Special Education and Related Services.* Washington, USA: American Association on Mental Retardation: 1999.

51. Wilson, B.N. & Kaplan, B.J. *Follow-up Assessment of Children Receiving Sensory Integration Treatment.* The Occupational Therapy Journal of Research 1994; 14:4.

52. Campbell, L. *Perceptual-Motor Programs, Movement and Young Children's Needs: Some Challenges for Teachers.* Journal of Early Child Development and Care 1997; 22:1.

53. Moore, J.B., Guy, L.M. & Gilmour Reeve, T. *Effects of the Capon Perceptual-Motor Program on Motor Ability, Self-Concept, and Academic Readiness.* Perceptual and Motor Skills 1984; 58.

54. Gallagher, S. & Cole, J. *Body Image and Body Schema in a Deafferented Subject.* The Journal of Mind and Behaviour 1995; 16:4.

55. Paillard, J. *Body Schema and Body Image - A Double Dissociation in Deafferented Patients.* In G.N. Gantchev, S. Mori & J. Massion (Eds.), *Motor Control: Today and Tomorrow.* Sofia, Bulgaria: Academic Publishing House: 1999.

56. Shontz, F.C. *Body Image and Its Disorders.* International Journal of Psychiatry in Medicine 1974; 5:4.

57. Bermúdez, J.L., Marcel, A.J. & Eilan, N. *The Body and the Self.* Massachusetts, USA: Massachusetts Institute of Technology: 1995.

58. Gardner, R.M. & Moncrieff, C. *Body Image Distortion in Anorexics as a Non-Sensory Phenomenon: A Signal Detection Approach.* Journal of Clinical Psychology 1988; 44:2.

59. Haggard, P. & Wolpert, D.M. *Disorders of Body Scheme.* Higher-Order Motor Disorders. In press.

60. Cash, T.F. & Brown, T.A. *Body Image in Anorexia Nervosa and Bulimia Nervosa.* Behavior Modification 1987; 11:4.

61. Offman, H. J. & Bradley, S.J. *Body Image of Children and Adolescents and Its Measurement: An Overview.* Canadian Journal of Psychiatry 1992; 37:6.

62. Bundy, A.C., Lane, S.J. & Murray, E.A. *Sensory Integration Theory and Practice.* Second Edition. Philadelphia, USA: F.A. Davis Company: 2002.

63. Arnheim, D.D. & Sinclair, W.A. *The Clumsy Child: A Program of Motor Therapy.* Second Edition. St. Louis, USA: The C.V. Mosby Company: 1979.

64. Short-DeGraff, M.A., Slansky, L. & Diamond, K.E. *The Validity of Preschoolers' Self-Drawings as an Index of Human Figure Drawing Performance.* The Occupational Therapy Journal of Research 1989; 9:5.

65. Ayres, A.J. & Reid, W. *The Self-Drawing as an Expression of Perceptual-Motor Function.* Cortex 1966; 2.

66. Abell, S.C., Wood, W. & Liebman, S.J. *Children's Human Figure Drawings as Measures of Intelligence: The Comparative Validity of Three Scoring Systems.* Journal of Psychoeducational Assessment 2001; 19.

67. Miller, L.J. *Miller Assessment for Preschoolers.* 1988 Revision. USA: The Psychological Corporation Harcourt Brace Jovanovich, Inc: 1988.

68. Woodburn, S.S., Fernández, H. & Boschini, C. *Relationships between the Goodenough-Harris Draw-A-Person Test and a Body-Image Test in Costa Rican Children.* Perceptual and Motor Skills 1989; 68.

69. Cherney, I.D., Seiwert, C.S., Dickey, T.M. & Flichtbeil, J.D. *Children's Drawings: A Mirror to Their Minds.* Educational Psychology 2006; 26:1.

70. Pfall, P.B. *Framing a Developmental Psychology of Art.* Human Development 1997; 40.

71. Lowenfeld, V. & Lambert Brittain, W. *Creative and Mental Growth.* Eight Edition. New York, New York, USA: Macmillan Publishing Company: 1987.

72. Strommen, E.F. & Smith, J.K. *Internal Consistency and Bias Considerations of the Goodenough-Harris Draw-A-Person Test.* Educational and Psychological Measurement 1987; 47.

73. Barnett, A. & Henderson, S.E. *Some Observations on the Figure Drawings of Clumsy Children.* British Journal of Educational Psychology 1992; 62.

74. Duffey, J.B., Ritter, D.B. & Fedner, M. *Developmental Test of Visual-Motor Integration and the Goodenough Draw-A-Man Test as Predictors of Academic Success.* Perceptual and Motor Skills 1976; 43.

75. Oakland, T. & Dowling, L. *The Draw-A-Person Test: Validity Properties for Nonbiased Assessment.* Learning Disability Quarterly 1983; 6.

76. Loxton, H., Mostert, J. & Moffatt, D. *Screening of Intellectual Maturity: Exploring South African Preschoolers' Scores on the Goodenough-Harris Drawing Test and Teachers' Assessment.* Perceptual and Motor Skills 2006; 103.

77. Boyatzis, C.J., Michaelson, P. & Lyle, E. *Symbolic Immunity and Flexibility in Preschoolers' Human Figure Drawings.* The Journal of Genetic Psychology 1995; 156:3.

78. Hendry, J. & Kerr, R. *Communication through Physical Activity for Learning Disabled Children.* Perceptual and Motor Skills 1983; 56.

79. Sisto, F.F. *Relationships of the Piagetian Cognitive Development to Human Figure Drawing.* Child Study Journal 2000; 30: 4.

80. Vinter A. & Picard, D. *Drawing Behavior in Children Reflects Internal Representational Changes.* In M.L. Simner, C.G. Leedham & A.J.W.M. Thomassen (Eds.), *Handwriting and Drawing Research: Basic and Applied Issues.* Amsterdam, Netherlands: IOS Press: 1996.

81. Lee, A. & Hobson, R.P. *Drawing Self and Others: How do Children with Autism Differ from Those with Learning Difficulties?* British Journal of Developmental Psychology 2006; 24.

82. Stiles-Davis, J., Janowsky, J., Engel, M. & Nass, R. *Drawing Ability in Four Young Children with Congenital Unilateral Brain Lesions.* Neuropsychologia 1988; 26:3.

83. Armentrout, J. *Effects of Perceptual Training on Children's Human Figure Drawings.* Journal of Genetic Psychology 1971; 119:2.

84. Beery, K.E. & Beery N. A. *The Beery-Buktenica Developmental Test of Visual-Motor Integration: Administration, Scoring and Teaching Manual.* Fifth Edition. Minneapolis, USA: NCS Pearson, Inc.: 2004.

85. Cox, M.V. *Children's Drawings of the Human Figure.* East Sussex, UK: Lawrence Erlbaum Associated Ltd.: 1993.

86. Barrett, M. & Eames, K. *Sequential Developments in Children's Human Figure Drawing.* British Journal of Developmental Psychology 1996; 14.

87. Martlew, M. & Connolly, K.J. *Human Figure Drawings by Schooled and Unschooled Children in Papua New Guinea.* Child Development 1996; 67.

88. Cox, M.V., Koyasu, M., Hiranuma, H. & Perara, J. *Children's Human Figure Drawings in the UK and Japan: The Effects of Age, Sex and Culture.* British Journal of Developmental Psychology 2001: 19.

89. Hagood, M.M. *The Use of the Naglieri Draw-a-Person Test of Cognitive Development: A Study with Clinical and Research Implications for Art Therapists Working with Children.* Art Therapy: Journal of the American Art Therapy Association 2003; 20:2.

90. Adler, P.T. *Ethnic and Socioeconomic Status Differences in Human Figure Drawing.* Journal of Consulting and Clinical Psychology 1971; 36:3.

91. Hagood, M.M. *A Correlational Study of Art-based Measures of Cognitive Development: Clinical and Research Implications for Art Therapists Working with Children.* Art Therapy: Journal of the American Art Therapy Association 2002; 19:2.

92. Motta, R.W., Little, S.G. & Tobin, M.I. *The Use and Abuse of Human Figure Drawings.* School Psychology Quarterly 1993; 8:3.

93. Phillips, C.J., Smith, B. & Broadhurst, A. *The Draw-A-Man Test: A Study of Scoring Methods, Validity and Norms with English Children at Five and Eleven Years.* Journal of Child Psychology and Psychiatry 1973; 14:2.

94. Piersel, W. & Santos, L. *Comparison of McCarthy and Goodenough-Harris Scoring Systems for Kindergarten Children's Human Figure Drawings.* Perceptual and Motor Skills 1982; 55.

95. Dugdale, J. & Dunn, K. *Patterns of Use of Psychological Tests in New Zealand.* Presentation at the Inaugural International Test User's Conference; 2002 July 3-5; Sydney, Australia.

96. Harrison, P.L., Schmitt, C.S. & Holder-Brown, L. *Comparison of Three Draw-A-Person Scoring Systems for Young Children.* Paper presented at the meeting of the National Association of School Psychologists; 1990 April; San Francisco, USA.

97. Wisniewski, J.J. & Naglieri, J. *Validity of the Draw-A-Person: A Quantitative Scoring System with the WISC-R.* Journal of Psychoeducational Assessment 1989: 7.

98. Naglieri, J.A. *Human Figure Drawings in Perspective.* School Psychology Quarterly 1993; 8:3.

99. New Zealand Ministry of Education. Introduction to School statistics: 2003. <http://www.minedu.govt.nz> [accessed 9 December 2003].

100. Tki Organization. Schools' Links: 2002. <http://www.tki.org.nz> [accessed 19 December 2003].

101. Bulluss, J. & Coles, P. *Language Follow Up Activities.* Melbourne, Australia: P.J. Developments: 1996.

102. New Zealand Ministry of Education. Schooling in New Zealand A Guide: 2001. <http:www.minedu.govt.nz> [accessed 8 December 2006].

103. Smartstarters. PMP Resources. <http:www.smartstarters.com.au> [re-accessed 8 December 2006].

104. Bulluss, J. & Coles, P. *Starter Activity Cards.* Melbourne, Australia: P.J. Developments: 1996.

APPENDIX A

PMP Implementation within the New Zealand Educational Context

The intervention under investigation, PMP, is typically conducted in primary schools in the first year of formal learning. It is

> *'a program for all children in the first three years of school, with the first year being the most important.'* [15, p1]

There is however, a large variation in how New Zealand schools implement PMP. Many run it for only the year one children. The programme may go for the entire school year or in rare cases only over the winter months. Not all schools include all three structural components. Sometimes the language follow-up sessions are not conducted. [15]

The New Zealand schools which implement PMP make the decision independently as there is flexibility within the New Zealand educational curriculum for schools to define the specific contents of their teaching curriculum. [102] The New Zealand Ministry of Education only sets general guidelines (statements) for curriculum content. Therefore each school uses the national curriculum statements to

> *'develop, and expand if desired, its own school curriculum and plan its own classroom programmes, also taking into account the goals and objectives of its local community.'* [102, p18]

Some schools have chosen to implement PMP because they believe it will assist children with school readiness. [32] Other schools implement it in the junior levels as a major part of their physical education programme. [15]

In New Zealand, PMP is not funded by the New Zealand Ministry of Education and schools fund the programme on their own initiatives e.g. with money obtained from school fund raising events or charitable trusts. Children who participate in PMP through their local school will not pay for participation in the programme. This is because it is seen as part of their learning experience which takes place during their school day.

APPENDIX B

PMP Screen Test, Resource Materials, Equipment, Structural Components and Copy of Activity Cards

An informal screening procedure called a 'screen test' has been developed by Bulluss and Coles. [2] Bulluss and Coles recommend that the screen test be administered to all the children early on in the school year, ideally before formal learning begins. The aim of the screen test is to assist in the early diagnosis of those children who have readiness/foundation/pre-requisite skill deficits which will hinder formal learning. Bulluss and Coles state that these problems will also become evident in the classroom and during PMP sessions.

The screen test covers the following areas: language (self, environment, auditory and visual association); motor (fine, laterality/dominance, body awareness/image); auditory skills (patterning, discrimination, closure, analysis, sequencing, repetition); visual skills (patterning, discrimination, completion, sequencing, figure/ground) and memory skills (visual and auditory). The information from this screen test can then be plotted on a graph for each child. When all the individual graphs have been completed, a class graph is then made showing class weakness and strengths. This information is then used to plan a class teaching programme suited to the needs and abilities of each child in the class. [2] The screen test is not specifically designed to be a pre-test or post-test to measure the effectiveness of PMP.

The drawing of self task appears in the screen test. The Goodenough Draw-a-Person scoring criteria for the figure drawing are provided in the PMP workshops to score the children's drawings of self. If required, the self drawings can be repeated later in the programme in order to evaluate the influence of PMP on body image. [15]

PMP has the following resource materials [103] which are relevant to this study:

- *A Perceptual Motor Program: A Manual for Teachers* - 3rd edition. A manual to aid schools in the set up and implementation of perceptual motor programmes.
- *Starter Activity Cards For A Perceptual Motor Program* - 2nd edition. A set of 100 activity cards used for running the PMP equipment sessions.
- *Extension Activity Cards for Perceptual Motor Program*. A further set of 100 activity cards.
- *Floor Session Plans for Starter Activity Cards* - 2nd edition. A set of cards with instructions on how to perform the movement patterns required in the equipment sessions.
- *Language Follow Up Activities for Starter Activity C*ards - 2nd edition. A set of 100 language activities covering language concepts used in PMP equipment sessions.
- Compact Discs *Moving Moving*. Two CDs with accompanying music for PMP floor sessions.

In addition, there is the following required equipment [2] which is divided into five categories:

- Eye/hand/foot co-ordination equipment e.g. rebound nets, skittles.
- Balance equipment e.g. balance beams, ladders.
- Fitness equipment e.g. ropes, scooter boards.
- Locomotion equipment e.g. hoops, bicycle tyres.
- Extra equipment e.g. cones, blindfolds, memory pictures.

Equipment can be made (instructions are given for some pieces) or purchased from certain suppliers. There is a comprehensive ideal equipment list and a shortened basic list for schools with financial constraints. [2]

PMP has three structural components, namely:

1. Floor sessions
2. Equipment sessions with evaluation
3. Language follow-up sessions

1. The floor sessions are introductory sessions aimed to introduce students to the movement patterns required in the equipment sessions. They consist of specific instruction and practice in skills such as underarm ball toss, heel toe walking etc. Movement to music activities are also performed during these times. The first six floor sessions are completed before any equipment sessions are conducted. Further floor sessions are then completed, one for every two or three equipment sessions for the duration of PMP. Floor sessions take about twenty to thirty minutes, are done in any safe area, at any time of day and are usually taken by the class teacher with the whole class as a group. [2]

2. Equipment sessions run from two to five sessions a week depending on the school. They take half an hour and are conducted at any time of the day in a large, safe area. Each equipment session consists of five activity 'stations' and children in groups of three to six spend five minutes at each station. Each station is dedicated to one of the following five areas: eye/hand/foot co-ordination, balance, fitness, locomotion and eye-tracking. There is one adult at each station, often parent volunteers, with at least one teacher present. [2] Each equipment

session uses the equipment in a more complex manner. In so doing the equipment is rotated through PMP so that the participants get a variety of eye/hand/foot co-ordination, balance, fitness and locomotion experiences. [1]

The illustrated starter (and extension) activity cards describe exactly what is to be done at each activity station. (Refer to the copy of the three examples at the end of this Appendix.) On the card there is always a main activity (described next to the heading *program station*) and sometimes additional activities (described under the heading *substation*). The cards also contain the following: what will be done in the accompanying floor session; key language used; suggestions for individualising up and down the activity; information on techniques; teaching points when performing the activity; and an evaluation question. [2] In addition, the activity card also lists in the top right corner the PMP Outcomes which are being worked on at that station. The activity stations which have activities designed to specifically improve body image, have been marked with an asterisk in Table C in Appendix C.

PMP is developmental and sequential [1] so the activity cards are used in numerical order. The first equipment session is conducted using activity cards one, two, three and four plus the first card for eye-tracking. Eye-tracking receives special emphasis and one of five eye-tracking activities is performed during each equipment session.

The evaluation of the children's performance during the equipment sessions will be explained using the following example. (Also refer to the copy of activity card S1 on p105.) During the first equipment session, the main programme station activity on card S1 is tossing, bouncing or bowling a 20cm ball to a helper. This will then be evaluated by the teacher present. The

teacher will answer the closed question printed on activity card S1 e.g. 'Can the student return the ball every time, to the helper, copying the helper's action correctly?' The teacher will then mark 'yes' or 'no' on an evaluation grid [1] which is supplied in the resources. The grid lists the children's names down the one side and the activity card numbers along the top. This evaluation grid thus shows whether a child can or can not complete the set activity. This evaluative data can then be interpreted in the light of the specified PMP Outcomes listed on the activity card. In this way specific outcomes are linked to the activity/ies performed on the activity card.

In the second equipment session undertaken later in the week, the main activity on activity card S2 will be evaluated. PMP follows a 'one in/one out' pattern for the entire duration of the programme [1] so that the activity first introduced, i.e. activity card S1 is omitted in the next session and replaced by a new one i.e. activity card S5.

3. The final structural component is the language follow up sessions. [2, 101] These occur for five to ten minutes in the classroom as a whole group immediately following each equipment session. These sessions aim to transfer language concepts such as in, through, beside, first, high etc. experienced in the equipment session, to the classroom situation. The children's language concepts are developed by writing and drawing their experiences onto worksheets, thereby moving from the real to the symbolic form. The children are encouraged to talk about their movement experiences and to identify these words when reading and writing. [1, 15, 101]

Copy of Activity Card S1

BALL PLAY

S 1

OUTCOMES

MOTOR
Eye / hand co-ordination

PERCEPTION
Laterality
Space awareness

SKILL
P.E. skill
Problem solving

PROGRAM STATION *Helper to toss, bounce or bowl 200mm ball to student. Student to return it to the helper the same way. Teach two handed bowl. Teach two handed underarm toss.*
SUB STATION *None required. All students to be involved in the Program Station.*

S 1

FLOOR SESSION *Teach two handed bowl action.*
Teach two handed underarm toss action.
Movement activity. "All of Me" (CD1)

LANGUAGE *same / different (ways to return the ball)*

INDIVIDUALIZING UP *Throw to student from further away. Try two bounces before catching.*

INDIVIDUALIZING DOWN *Bowl along the ground only. Do not throw or bounce.*

TECHNIQUES
Bowl *Hold the ball, one hand on either side of the ball, feet apart. Bowl to start from central point between legs, both arms giving equal thrust.*
Toss *Hands together in front of body, palms up. Ball resting on hands. Move hands together in direction of target to give underarm action.*

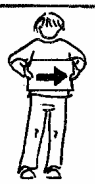
TEACHING POINTS *Stand within 2 metres of students to start, and move further away as the skills are developed. Bowling should be controlled and steady with the ball on the floor at all times.*

EVALUATION *Can the student return the ball every time, to the helper, copying the helper's action accurately?*

Copy of Activity Card S23

INDIVIDUAL ROCKER

S 23

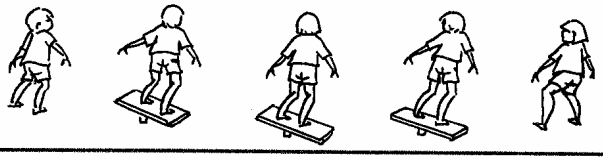


OUTCOMES

MOTOR
Balance

PERCEPTION
Body image Body control
Laterality
Directionality

SKILL
Language
Confidence
Problem solving



PROGRAM STATION *Teach technique for tilting forwards, backwards, left and right on the individual rockers. Tilt the rocker in the direction indicated by the arrow. Helper to hold the cards. (Cards at back of this book.)*
SUB STATION *Students waiting can practise the movements as for Floor Session.*

FLOOR SESSION *Teach individual rocker actions.* **S 23**
i.e. how to tilt the rocker forward, backward, right and left.
Movement activity. "Middle 'n' Sides" (CD1)
Movement activity "Let's March Around" (CD1)
Movement activity "My Partner and Me" (CD1)

LANGUAGE *forward, backward, right, left, balance*

INDIVIDUALIZING UP *Student to name the direction in which the arrow is pointing.*
INDIVIDUALIZING DOWN *Hold the student's hands in order to steady them on the individual rocker.*

TECHNIQUES
Individual rocker *The body must remain in a balanced position at all times. To tilt the individual rocker forward, bend the knees. To tilt backward, put the bottom out keeping legs straight, weight on heels. To tilt right or left, lean to the appropriate side by bending a knee. Arms to be out sideways at 45° angle to aid balance. Feet must remain still, in the same place on the individual rocker. Each foot should be in the centre of each half of the individual rocker. Always come back to balance between directional moves.*
TEACHING POINTS *On the individual rocker, the student must use the correct technique for safety. Do not allow the students to bend too far forward on the individual rockers. Hold the cards horizontally at first, i.e. on the same plane as the floor. Gradually turn them so that they are held on the perpendicular plane, i.e. at right angles to the floor.*
EVALUATION *Can the student balance on the individual rocker and tilt it the four ways and return to balance?*

Copy of Activity Card S41

FOREHAND STRIKE

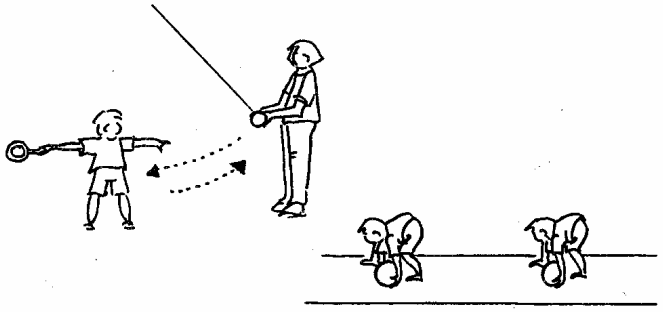
S 41

OUTCOMES

MOTOR
Eye / hand co-ordination

PERCEPTION
Laterality
Body image Body control
Rhythm

SKILL
P.E. skill



PROGRAM STATION *Student to hit suspended ball with wooden bat. Single release hit. Helper to release the ball so that it swings towards the student. The student hits the ball and helper catches it.*
SUB STATION *Launch board practice. Try to catch bean-bag launched from board. Dribble 200mm ball between tape lines with hands. All students to have a turn at hitting and at the launch board.*

FLOOR SESSION *Review forehand strike action. (Ref. Act S 29)* **S 41**
Review launch board action. (Ref. Act S 21)
Movement activity "Moving Fun" (CD1)
Fine motor activity "Fun with Rhythm Sticks" (CD1)

LANGUAGE *across (arms for hitting) up, down, straight*

INDIVIDUALIZING UP *Try continuous hitting. Try catching the bean bag in a container from launch board.*

INDIVIDUALIZING DOWN *Continue to pattern student for hitting. Do not try catching the bean-bag when using the launch board.*

TECHNIQUES

Forehand strike *Student to hold the bat in dominant hand with all fingers around the handle, thumb underneath. Stand directly opposite the ball when in static position. Ball should be at student's waist height. Begin with arms fully extended sideways. Swing both arms across body with dominant hand on top, non bat hand crosses under bat hand. Arm and bat in straight line. Helper to release the ball so that it swings towards the student to hit. Helper to catch the ball after it is hit. Student to immediately swing arms back to starting position ready for the ball again. Student to watch ball, not bat. Maintain good posture while hitting.*

Launch board *The ball of the dominant foot to be over the pivot point. i.e. the rod under the launch board. Keep the ball of the foot on the launch board at all times. Lift the heel and bang it down quickly so that the bean-bag is launched into the air. No movement on the floor of non dominant foot which is placed just slightly further back than the one on the launch board.*

TEACHING POINTS *The helper is to release the ball so that it swings towards the student. The student hits the ball using the correct technique and the helper catches it as it returns. Allow the student to assume the correct starting position before releasing the ball again. Do not allow students to lift the whole foot off the launch board. Use only dominant foot on the board. Do not jump or stomp on the launch board.*

EVALUATION *Can the student hit the ball to the helper using the correct technique at least twice while at the program station?*

APPENDIX C

Summary of Contents of PMP Activity Stations

What follows is a summary of the contents of 41 activity stations. [104] The children in the experimental group at School A1 performed these activities as prescribed on a rotational basis for 19 weeks over the six month period.

Table C PMP Activity Cards with Station Name and Activity Description

Card	Station Name	Activities
S1	**Ball Play**	Toss, bounce and bowl 20cm ball
S2	**Basic Movement***	Jump forward in and out of tyres and over tape line
		Crawl astride rope and through shapes
S3	**Heel Against Toe Walk***	Heel toe walk along tape
		Jump forwards and backwards over rope
		Walk between ladder rungs
S4	**Obstacle Course**	Jump onto pictures in memorised order (2 items)
		Crawl through maze
		Jump side to side over tape
S5	**Bean-Bag Toss***	Toss bean bags into tyres
		Seated ball bowl to partners
S6	**Rhythm Ball***	Bounce around circuit
		Jump forwards over tape (becomes wider)
S7	**Crawl***	Monkey walk along ladder
		Crawl along plank

		Dribble 20cm ball with hands in monkey walk position
S8	**Obstacle Course**	Crawl through boxes and shapes Jump over rope Pencil roll along mat Jump on pictures in memorised order
S9	**Skittles**	Two handed bowl with 20cm ball to skittles Balloon tap
S10	**Scooter Board**	Move scooter board up to and around cone, under rod and back to start Bean bag toss
S11	**Jump from Box***	Crawl up plank Jump from box to mat Heel toe walk along tape Monkey walk back to plank
S12	**Obstacle Course**	Hop beside rope Jump on picture in memorised sequence (2 or 3) Crawl in and out between ladder rungs Caterpillar walk
S13	**Box Roll**	Memory activity, bowling 15cm balls into boxes in sequence (2,3 or 4 items) Balloon tap to partner
S14	**Space Walk**	Jump onto grid marker following single direction

		Crawl along chalk pattern
S15	**Body Rocker***	Sit and balance on rocker with partner
		Cross pattern walk over rope
S16	**Obstacle Course***	Crawl up ladder, crawl along plank
		Jump from box to mat
		Memory activity putting coloured toys in order
		Bunny hop into tyres
S17	**Ball Bounce***	Two handed ball bounce 20cm ball
		Underarm toss 15cm ball at rebound net
S18	**Posting**	Post bean bags through hoop
		Monkey walk around cones
		Spin in Dizzy Giddy
S19	**Beam Walk***	Walk beam
		Heel toe walk on tape
S20	**Obstacle Course**	Bounce 15cm ball over rope
		Monkey walk along ladder according to directions
		Pull up on plank
		Crawl through maze
S21	**Launch Board***	Launch bean bag off board
		Bat balloon with paper bat
S22	**Rhythm Ball**	Bounce rhythm ball as directed into large shapes
		Bean bag toss into tyre while in monkey walk position

S23	**Individual Rocker***	Stand and tilt rocker in all directions as instructed
S24	**Obstacle Course***	Crawl through maze Jump onto mat Memory activity jumping into tyres in order Walk beam - forwards, backwards, sideways Bunny hop in tyres
S25	**Overhand Throw***	Overhand throw bean bag to rebound net and catch with both hands Throw quoits at peg
S26	**Space Walk**	Jump onto markers following pattern Pencil roll along mat Hopscotch in tyres Cross pattern walk using ladder rungs
S27	**Body Rocker***	Hold balance on rocker with partner for as long as possible Play shift bean bag game, throwing it and jumping into tyres to retrieve it
S28	**Obstacle Course**	Walk seesaw plank Memory jumping on pictures in order (2,3,4, or 5) Crawl through maze Bowl 20cm ball under rod Caterpillar walk
S29	**Forehand Strike**	Hit suspended ball with bat

		Dizzy Giddy game with 15cm ball, to spin round rim Skittles game
S30	**Long Rope Skipping**	Skip with fully turned rope
S31	**Shape Walk***	While blindfolded walk around shape and name it Sit cross legged on individual rockers and throw balloon ball to partner
S32	**Forward Roll***	Forward roll and pencil roll Memory activity jumping on pictures in order Bounce 15cm ball on plank while walking on plank Crawl between ladder rungs
S33	**Box Roll**	Memory activity bowling 20cm balls in boxes in given order Bounce 15cm balls around cones
S34	**Scooter Board**	While on scooter board transfer bean bags from one tyre to another as quickly as possible Spin in Dizzy Giddy
S35	**Beam Walk***	Walk beam while picking up bean bags and tossing them to partner Balance body rocker with partner
S36	**Obstacle Course***	Crawl through maze Slide down plank Memory activity jumping on numbers in order

		Jump over rod Hop beside rope Star jump pattern in tyres
S37	**Overhand Throw***	Throw bean bag at rebound net Tap balloons with bats
S38	**Long Rope Skipping***	Introduce limited skips and run out
S39	**Individual Rocker***	In standing tilt rocker in the direction given, come back to balance in between moves Jump grid according to directions
S40	**Obstacle Course**	Crawl up ladder Move along plank Jump from box, over rod and land on mat Walk beam with bean bag on head Memory activity jumping on numbers in order Caterpillar walk
S41	**Forehand Strike**	Hit suspended ball with bat after a suspended release from helper Launch board practice to catch bean bag Dribble ball with hands

Key: * = Activities in this station classified by PMP authors as designed to improve body image

APPENDIX D

Information on the School Decile

The New Zealand Ministry of Education funds compulsory schooling in state and integrated schools (Schools that were private but still own their own buildings and land). Operational funding is provided for the general running expenses of a school. In addition, many school boards raise additional funds from their local community to fund extra activities and staff. The amount of operational funding that a school receives depends on its decile ranking. The lower the decile rank, the more per pupil funding is received from the government. [102]

Census information and school ethnicity data are used to calculate a school's decile rank. A school's decile will indicate the

> *'extent to which a school draws its students from low socio-economic communities.'* [37, p1]

These communities are identified based on socio-economic indicators. Household income, occupation, household crowding, educational qualifications and income support are five factors from the census information that make up the socio-economic indicator. The sixth factor is ethnicity, defined as the percentage of Maori and Pacific Islander students, and students who have refugee status. The six scores for each school are added together and this total gives an overall standing in relation to all the other schools in New Zealand. Schools are then divided into even groups called deciles. Thus

> *'decile one schools are the 10% of schools with the highest proportion of students from low socio-economic communities, whereas decile ten schools are the 10% of schools with the lowest proportion of these students.'* [37, p1]

The two schools in this study are decile two schools. Thus they have equal access to resources and funding and have children from similar socio-economic backgrounds.

APPENDIX E

Copy of Study Information Sheet

c/- Postshop Rotorua
Hinemoa Street
Rotorua
2004

Dear Parents/Caregivers,

I am an occupational therapist currently working here in Rotorua. As part of my ongoing studies I am doing a research project in several Rotorua Primary Schools. My research project is about how children's drawings develop over time. I am especially interested in 5 year old children's drawings.

The principal of your child's school is aware of my research project and will also be able to answer any questions you may have. My project requires 5 year old children to draw some pictures in February 2005 and again 6 months later in August 2005. Your child is under no obligation to participate in the project. The children who do participate will be instructed by me with support from their teacher at school and the drawings will be done during the school day. I will collect the drawings which will only be used for the purposes of this project. Your child's name and the school's name will not be used in the project.

Please complete the form below indicating whether you would like or not like your child to participate in the project. Please detach and return the lower part of the form to the school. Please note that if you give consent and then change your mind, you are welcome to withdraw your child from the project at any stage.

I am happy to answer any questions you may have. I can be contacted on 021 033 8758.

Thank you for your time and consideration of this project.

Yours sincerely,

Ingrid Köhne
Occupational Therapist

Copy of Parental Consent Form

Informed Consent Form – please detach and return to school

I _____ (full name) parent/caregiver

would like □ (please tick appropriate box)

would not like □

_____ (child's name) to participate in the research project.

Signature of parent/caregiver _____

Signature of researcher _____

Date _____

Copy of Child Assent Form

The following was read to the child before handing out the papers and pencils. Their response was recorded below. If their response was 'no', they were not required to do the drawings.

Child Informed Consent Form

Would you like to draw some pictures of people, today? You can say yes or no.

Yes □ Please tick appropriate box

No □

_____

APPENDIX F

Copy of Ethical Clearance Certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Kohne

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER M040937**
PROJECT	The Effect of a Perceptual Motor Program on theDrawing of a Person by 5 Year Old New Zealand Children
INVESTIGATORS	Mrs I Kohne
DEPARTMENT	School of Therapeutic Sciences
DATE CONSIDERED	04.10.01
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 04.10.28 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable

cc: Supervisor : Mrs P De Witt

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX G

Copy of Letter of Permission from School A1 Principal

SELWYN PRIMARY SCHOOL
Te Puna o Nga Tumanako
(The Spring of Hope)

26 May 2004

Dear Sir/Madam

The Selwyn School Board of Trustees met on Monday 24 May to discuss Ingrid Kohne's research proposal.

There was unanimous agreement for children attending the school to be participants in the research subject to individual parental approval.

Yours faithfully,

Tony Pope
PRINCIPAL

Old Quarry Road, ROTORUA.
Telephone: (07) 348 4687 • Fax: (07) 348 9326 • Email: popet@selwyn.primary.school.nz

Copy of Letter of Permission from School A2 Principal

WESTERN HEIGHTS PRIMARY SCHOOL
TE KURA O WHAKAAHU

Clayton Road
Rotorua
Phone 0-7-348 8459
Fax 0-7-348 8069
Email whpsadmin@whp.school.nz

Principal
Brent Griffin

E TU HEI MAUNGA

2 June 2004

To Whom It May Concern:

Ingrid approached me to ask permission for Western Heights Primary School to be involved in the research project which is part of her Masters in Occupational Therapy.

We would be delighted to have Ingrid involved in our school for parts of the 2005 year.

We wish Ingrid all the best with her studies.

Thank you

Brent Griffin

APPENDIX H

Copy of DAP Scoring System Sheet

The DAP Scoring System

1. ARMS
- a) Presence — Any representation; only one needed.
- b) Detail 1 — Both arms (one if in profile) in two dimensions: arms are not drawn using one line, but have length and width.
- c) Detail 2 — Both arms (one if in profile) at side pointing downward, or in action. As long as the arms point downward, credit may be given.
- d) Proportion* — Length greater than width in both arms; two-dimensional arms required.
- e) Bonus — Score if a-d are credited.

2. ATTACHMENT
- a) Attach 1 — Head attached to neck or trunk.
- b) Attach 2 — Two arms (one if in profile) attached to trunk at any point.
- c) Attach 3 — Two arms and two legs (one each if in profile) attached to trunk at any point. (Two feet without legs does not pass this item.)
- d) Attach 4 — Arms and legs attached to trunk at appropriate places. For credit, both arms (one if in profile) must be connected to the top half of the trunk, and both legs (one if in profile) must be attached to the bottom half of the trunk. Measure the length of the trunk from the top, where it meets the head or neck, to the bottom, where it meets the legs or crotch.
- e) Bonus — Score if a-d are credited.

3. CLOTHING
- a) Presence — Any representation of one item shown in any manner (e.g., shading or buttons).
- b) Detail 1 — Clothing without transparencies: no body parts show through the clothing.
- c) Detail 2 — Any two articles of clothing (*except* eyeglasses) shown in any way (e.g., row of buttons indicating shirt, pants, etc.).
- d) Detail 3 — Three articles of any type (*except* eyeglasses), e.g., pockets indicating pants, shoes (two shoes = one article), shirt, hat, necklace, watch.
- e) Bonus — Score if a-d are credited.

4. EARS
- a) Presence — Any representation; only one needed.
- b) Detail 1 — Both ears shown (one if in profile).
- c) Detail 2 — Any detail in one ear: earring, lobe, etc.
- d) Proportion* — Vertical greater than horizontal dimension in *both* ears (one if in profile).
- e) Bonus — Score if a-d are credited.

5. EYES
- a) Presence — Any representation; only one needed.
- b) Detail 1 — *Both* eyes (one if in profile) drawn in two dimensions: open or filled-in circle, but more than a single dot.
- c) Detail 2 — Any detail (e.g., pupil, lash, eyebrow, eyeglasses) added for *both* eyes (one if in profile).
- d) Proportion* — Horizontal greater than vertical dimension in *both* eyes (one if in profile).
- e) Bonus — Score if a-d are credited.

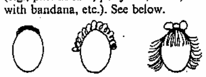
6. FEET
- a) Presence — Any representation, only one needed.
- b) Detail 1 — Feet are drawn in two dimensions, not one line.
- c) Detail 2 — Any detail on *both* feet (e.g., lace, toe, heel, etc.)
- d) Proportion* — Length greater than width (or height) in *at least* one foot. Two-dimensional foot, not one line.
- e) Bonus — Score if a-d are credited.

7. FINGERS
- a) Presence — Any representation; any number of fingers on hand (e.g., circle at end of arm).
- b) Detail 1 — Five fingers on either hand, drawn in any manner.
- c) Detail 2 — Five fingers on *both* hands (one if in profile), drawn in any manner. Note: thumb counts as a finger.
- d) Detail 3 — Thumb clearly present in *both* hands; may be indicated by opposition to the fingers; location of the thumb is not important; mitten hand with a thumb is creditable.

Credit 7d — Do Not Credit 7d

- e) Proportion 1 — All fingers in two dimensions, not one line.
- f) Proportion 2* — Length greater than width in more than half of two-dimensional fingers.
- g) Bonus — Score if a-f are credited.

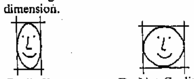
8. HAIR
- a) Presence — Any representation, however crude.
- b) Detail 1 — Hair, however crude, on more than top of head. This includes sides of head and other areas (beard, mustache, etc.).
- c) Detail 2 — Hair clearly has distinct style or detail (e.g., part in hair, pony tail, bows, tied with bandana, etc.). See below.



Credit 8a — 8a and b — 8a, b, c, and d

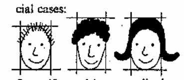
- d) Bonus — Score if a-c are credited.

9. HEAD
- a) Presence — Any representation.
- b) Proportion* — Vertical greater than horizontal dimension.



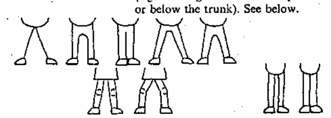
Credit 9b — Do Not Credit 9b

- c) Bonus — Measurement of the vertical and horizontal dimensions of the head is sometimes obscured by the hair, a hat, etc. If the entire outline of the head is visible, score as indicated above. If, however, a portion of the outline of the head is blocked by hair, measure to the top of the hair as the vertical dimension. Measure vertical and horizontal dimensions in this manner in these special cases:



Score if a and b are credited.

10. LEGS
- a) Presence — Any representation, only one needed.
- b) Detail — Either: knee (a break in the leg or other obvious indication) *or* crotch (legs converge and meet at a point at or below the trunk). See below.



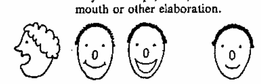
Credit 10b — Do Not Credit 10b

- c) Proportion* — Length greater than width in *both* legs; two-dimensional legs required. See below.

Credit 10c — Do Not Credit 10c

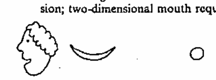
- d) Bonus — Score if a-c are credited.

11. MOUTH
- a) Presence — Any representation.
- b) Detail — Any detail: lips, teeth, two-dimensional mouth or other elaboration.



Credit 11b — Do Not Credit 11b

- c) Proportion* — Horizontal greater than vertical dimension; two-dimensional mouth required.



Credit 11c — Do Not Credit 11c

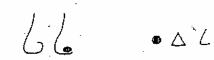
- d) Bonus — Score if a-c are credited.

12. NECK
- a) Presence — Any representation.
- b) Detail 1 — Neck in two dimensions, not one line.
- c) Detail 2 — Neck and head or neck and trunk drawn in continuous line. If the neck is cut by a shirt or neckline but is obviously drawn to meet this criterion, give credit. See below.

Credit 12c — Do Not Credit 12c

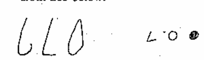
- d) Bonus — Score if a-c are credited.

13. NOSE
- a) Presence — Any representation.
- b) Detail — Nostril or other detail present.



Credit 13b — Do Not Credit 13b

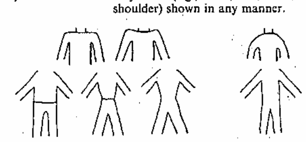
- c) Proportion* — Vertical greater than horizontal dimension. See below.



Credit 13c — Do Not Credit 13c

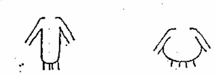
- d) Bonus — Score if a-c are credited.

14. TRUNK
- a) Presence — Any representation.
- b) Detail — Any detail (e.g., waist, belt, chest, shoulder) shown in any manner.



Credit 14b — Do Not Credit 14b

- c) Proportion* — Length greater than width.



Credit 14c — Do Not Credit 14c

- d) Bonus — Score if a-c are credited.

Maximum Drawing Score: 64

* For proportion items, measure and compare the longest dimensions - any difference is sufficient for credit.

Copy of DAP Response Form

DAP DRAW A PERSON

A Quantitative Scoring System

Jack A. Naglieri

RESPONSE FORM

Name _____

Sex _____ Age _____ Birth Date _____

School _____

Grade _____ Teacher _____

Today's Date _____

Examiner _____

ISBN 015-4083-46-1

9 780154 083463

THE PSYCHOLOGICAL CORPORATION
HARCOURT BRACE JOVANOVICH, INC.

015-408346-


MAN


WOMAN


SELF
25 26 27 28 29 30 A B C D E

Copy of DAP Record Form

DAP DRAW A PERSON

A Quantitative Scoring System

RECORD FORM

Jack A. Naglieri

Examinee Information

Name _____ Sex _____

School _____

Grade/Teacher _____

Home Address _____

_____

Home Telephone _____

Examiner _____

Date of testing ___ yr ___ mo ___ day

Date of birth ___ yr ___ mo ___ day

Age ___ yr ___ mo ___ day

Score Summary

Drawing	Raw Score	Standard Score	Percentile	___ % Confidence Interval	
				Standard Scores	Percentiles
Man (M)				(± ___) ___ to ___	___ to ___
Woman (W)				(± ___) ___ to ___	___ to ___
Self (S)				(± ___) ___ to ___	___ to ___
Total (M + W + S)				(± ___) ___ to ___	___ to ___
Total Test Classification:					

ISBN 015-4083-47-X

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THE PSYCHOLOGICAL CORPORATION
HARCOURT BRACE JOVANOVICH, INC.

015-408347

Administration Directions

Say: **I'd like you to draw some pictures for me. First, I'd like you to draw a picture of a man. Make the very best picture you can. Take your time and work very carefully, and I'll tell you when to stop. Remember, be sure to draw the whole man. Please begin.**
(Allow 5 minutes.)

MAN ITEM SCORES

1. ARMS a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
2. ATTACHMENT a) Attach 1 ☐ b) Attach 2 ☐ c) Attach 3 ☐ d) Attach 4 ☐ e) Bonus ☐	Max = 5 Total	☐
3. CLOTHING a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Detail 3 ☐ e) Bonus ☐	Max = 5 Total	☐
4. EARS a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
5. EYES a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
6. FEET a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
7. FINGERS a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Detail 3 ☐ e) Proportion 1 ☐ f) Proportion 2 ☐ g) Bonus ☐	Max = 7 Total	☐
8. HAIR a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Bonus ☐	Max = 4 Total	☐
9. HEAD a) Presence ☐ b) Proportion ☐ c) Bonus ☐	Max = 3 Total	☐
10. LEGS a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐
11. MOUTH a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐
12. NECK a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Bonus ☐	Max = 4 Total	☐
13. NOSE a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐
14. TRUNK a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐

Use the DAP Scoring System in the Manual (Chapter 4) or on the DAP Scoring Chart to determine item scores.	WORKING TIME (Maximum = 5 min.) ☐	TOTAL MAN RAW SCORE (Maximum = 64) ☐

Examiner's Notes	Examinee's Comments

Administration Directions

Say: **This time I want you to draw a picture of a woman. Make the very best picture you can. Take your time and work very carefully, and I'll tell you when to stop. Be sure to draw the whole woman. Please begin.** (Allow 5 minutes.)

WOMAN ITEM SCORES

1. ARMS a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
2. ATTACHMENT a) Attach 1 ☐ b) Attach 2 ☐ c) Attach 3 ☐ d) Attach 4 ☐ e) Bonus ☐	Max = 5 Total	☐
3. CLOTHING a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Detail 3 ☐ e) Bonus ☐	Max = 5 Total	☐
4. EARS a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
5. EYES a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
6. FEET a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
7. FINGERS a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Detail 3 ☐ e) Proportion 1 ☐ f) Proportion 2 ☐ g) Bonus ☐	Max = 7 Total	☐
8. HAIR a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Bonus ☐	Max = 4 Total	☐
9. HEAD a) Presence ☐ b) Proportion ☐ c) Bonus ☐	Max = 3 Total	☐
10. LEGS a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐
11. MOUTH a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐
12. NECK a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Bonus ☐	Max = 4 Total	☐
13. NOSE a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐
14. TRUNK a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐
Use the DAP Scoring System in the Manual (Chapter 4) or on the DAP Scoring Chart to determine item scores.	WORKING TIME (Maximum = 5 min.) ☐	TOTAL WOMAN RAW SCORE (Maximum = 64) ☐

Examiner's Notes	Examinee's Comments

Administration Directions

Say: **Now I'd like you to draw a picture of yourself. Be sure to draw the very best picture you can. Take your time and work very carefully, and I'll tell you when to stop. Be sure to draw your whole self. Please begin.** (Allow 5 minutes.)

SELF ITEM SCORES

1. ARMS a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
2. ATTACHMENT a) Attach 1 ☐ b) Attach 2 ☐ c) Attach 3 ☐ d) Attach 4 ☐ e) Bonus ☐	Max = 5 Total	☐
3. CLOTHING a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Detail 3 ☐ e) Bonus ☐	Max = 5 Total	☐
4. EARS a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
5. EYES a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
6. FEET a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Proportion ☐ e) Bonus ☐	Max = 5 Total	☐
7. FINGERS a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Detail 3 ☐ e) Proportion 1 ☐ f) Proportion 2 ☐ g) Bonus ☐	Max = 7 Total	☐
8. HAIR a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Bonus ☐	Max = 4 Total	☐
9. HEAD a) Presence ☐ b) Proportion ☐ c) Bonus ☐	Max = 3 Total	☐
10. LEGS a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐
11. MOUTH a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐
12. NECK a) Presence ☐ b) Detail 1 ☐ c) Detail 2 ☐ d) Bonus ☐	Max = 4 Total	☐
13. NOSE a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐
14. TRUNK a) Presence ☐ b) Detail ☐ c) Proportion ☐ d) Bonus ☐	Max = 4 Total	☐

Use the DAP Scoring System in the Manual (Chapter 4) or on the DAP Scoring Chart to determine item scores.	WORKING TIME (Maximum = 5 min.) ☐	TOTAL SELF RAW SCORE (Maximum = 64) ☐

Examiner's Notes	Examinee's Comments

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