FITNESS CHARACTERISTICS OF CLUMSY CHILDREN

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ABSTRACT

Physical fitness, in its broadest sense, has an effect on the ability to participate in physical activity. Some components of fitness also contribute to the control and execution of a any given task. Measures of physical performance, considered important for the execution of motor skills, were taken on 17 clumsy children. A profile of the percentile rankings for the group is presented, eliciting the conclusion that the group has low overall fitness levels. Exceptions to this trend both in subject profiles and in the single fitness parameter of flexibility were identified. The exception to the trend of low fitness, in terms of parameters measured, was in the high levels of flexibility at the hip, seen in the group. However, this result may well be enigmatic, as flexibility can be a consequence of a poor musculature. There were three exceptions, in terms of subjects, which tended to be aberrations in deviation from the group trend. Two children, had profiles which were not completely acceptable but may be expected in a normal group of children. Only one child had a fitness profile that would be conducive to a reasonable level of physical performance. Otherwise, the children either have a profile which is consistently low over the six parameters, or have some parameters at an extremely low level. Given that there are only slight divergences, it would still be reasonable to reinforce the initial conclusion, that the fitness levels of the group are low.

The recent literature establishes there is a small but significant number of children who have movement problems. Without help, clumsy children may suffer from a range of emotional, social and learning problems that they carry with them into adulthood. Knuckey and Gubbay (1983) found, although clumsy children appeared to out grow their movement problems, once under stress these problems re-appeared. Left untreated, the effects of the condition may restrict the individual to certain ranges of occupation and may influence their attitude to physical activity and positive health practices. In general, it has become the teacher's task to identify and rectify the situation as its effect can be wider than movement difficulties. Some instruments for identification are available and prognosis for clumsy children, although unclear, appears positive if appropriate assessment schedules and remedial programs are instituted. However, often there is a lack of importance assigned to movement skills by many teachers, coupled with an inability to recognise and plan a program for the clumsy child. In the main, this is attributed to inadequacies in teacher training. The perceived lack of concern for these children is exemplified by the dearth of trained specialist physical education teachers assigned to primary schools, by the various education bureaucracies.

Professions dealing with clumsy children recognise treatment should take into account and reflect the causes of the clumsiness. The literature indicates there are many causes that may result in a child being defined as clumsy (Henderson & Hall 1982). These causes cannot be isolated into single entities used to remedy the particular problem, as the nature of clumsiness is multi-faceted. Cermak (1985) recommended that the cause should be identified prior to treatment. She claims, even though therapists, educators and neurologists are still trying to determine which type of child responds to which type of treatment, this indicates that a number of therapeutic approaches need to be considered. Larkin and Hoare (1991) suggested environmental factors interact with many other casual factors and as a result a circular effect can take over. Difficulty in learning to move, with its attendant lack of success, leads to withdrawal from demanding situations which in turn leads to a deprived environment.

Test batteries which have been designed to assess the extent of a child's clumsiness have some difficulties associated with their effectiveness (Sovik and Maeland 1986). . These difficulties are related to the limited knowledge of the nature of motor abilities (Hopkins, Kalverboer & Geuze 1993). Despite the fact that it is difficult to diagnose the exact cause of an individual's clumsiness, doing something to assist them with the problem is obviously beneficial. This is especially so if the help given is related, as closely as can be determined by appropriate testing, to the particular cause of the problem. It is important that we do as much as we can to identify these children and establish remedial programs, aimed at improving their movement potential.

Authors in the Human Movement field of study (Bloomfield 1992; Magill 1993), have recommended a physical fitness profile as a useful tool in understanding the requirements of human physical performance. Physical fitness, in its broadest sense, has a considerable effect on the ability to participate in physical activity. Some components of fitness also contribute to the control and execution of a given task, e.g. arm strength would have an influence on the ability to throw a ball. Furthermore, items in such a test battery are closely linked with health-related fitness tests giving an additional window through which to view the child. In the main, children experiencing difficulty with movement tasks tend to lack general fitness, endurance and strength (O'Beirne, Larkin and Cable 1994).

METHODS

SUBJECTS

A remedial physical education program (Gymstart) was set up at the University of New England (UNE), for children from surrounding schools. Three schools cooperated in the screening process. Two of the schools already had a link with UNE, as participants in the "Aussie Sport Teaching Program", these were state schools. The third was selected as the only independent school (Catholic primary) to show a keen interest in the program, on initial contact with Principals. 24 Year One and Year Two children were identified and ranked as being most in need of such a program, as a consequence of the three-step screening process. Of these 24 children, 19 accepted an offer of a place in the Gymstart program and 17 completed the 22 twice weekly sessions.

The school years (or grades) chosen were on the basis of early intervention being the most effective and that the age range selected was deemed the most receptive to a remedial program. This meant that the age of most children was between six and seven years, as they entered the program. Kindergarten children were not screened, as they were regarded as too young to show essential differences between a lack of skill and a lack of maturation at this stage of screening by teachers.

RATIONALE

Children in the program were evaluated in a number of broad categories including : physical capacities; neuromuscular development; psycho-social determinants; and response to the program. This holistic approach to the assessment of the children, encompassed both qualitative and quantitative research strategies. It was felt that a physical fitness profile was essential if the holistic approach were to be maintained, as leaving the parameters of analysis merely to motor control and the socio-psychological aspects would not seem to cover all relevant aspects.

The items in the fitness battery were selected with consideration given to two broad criteria, guiding general selection. Firstly, the items were selected for their usefulness, in providing indicators to performance and aspects of health-related level of fitness. Secondly, the items were selected in terms of their practicality in : administration; the availability of equipment; and the suitability of the normative tables to the characteristics of the children (in particular their ages). These measures of physical performance, considered appropriate and able to be administered in the field, which collectively could be considered as a fitness profile, were therefore taken on the children. They were measures of : aerobic capacity (stamina), speed, abdominal strength (and local endurance), upper body strength (arm strength), flexibility (at the hip) and leg power.

PROCEDURES

The fitness parameters and the procedures which took place to conduct testing of these on the children are identified in Table 1. The procedures followed in all items except one, were straightforward and require no further elaboration. In conducting the 800 metre run, the test of aerobic capacity, the children ran with instructors to assist with pacing, etc. due to their ages. This was the only test item which adopted a variation to the protocols described in the various test manuals.

Table 1 : Measures Taken to Establish Children's Fitness Profile

DIMENSION	PROCEDURE	INSTRUMENT	REFERENCE (Protocol & Norm Table)
Aerobic Capacity	800 metre run	• 400 metre track • Stopwatch	Procedure & Normative Table - CAPHER
Flexibility	Capacity to reach toes with finger tips - straight knee	Sit & Reach Apparatus	Procedure & Normative Table - CAPHER
Leg Strength /Power	Vertical Jump	• Blackboard • Chalk • Metre Rule	• Procedure - Bloomfield et al. (1986) • Normative Table - Blanksby et al. (1994)
Upper Body Strength	Flexed Arm Hang	• Horizontal Bar • Stopwatch	Procedure & Normative Table - CAPHER
Abdominal Strength/ Local Endurance	Number of sit-ups in 60 seconds	Stopwatch	Procedure & Normative Table - CAPHER
Running Speed	50 metre sprint	• Grassed Track • Stopwatch	Procedure & Normative Table - CAPHER

Selection of the Tests

With regard to specific selection of the test items and/or the methods of interpreting the data, some explanatory comment is required. The adoption of the CAPHER (based on a Canadian population) procedures and normative tables rather than the ACHPER (1992) fitness test battery (based on an Australian population) was due to the Canadian normative tables showing standards for the ages of the children in this study. In addition, one item on the ACHPER battery was considered unsuitable for younger children, due to its reliance on higher perceptual-motor processes to complete the task, i.e. the sit up test requires fairly skilled judgement to keep pace with a cadence sound. In any event, the Canadian population and its ethnic derivations could be considered close enough to the Australian population (Upshall 1990) for genuine comparisons to be made. In general the criteria for selection of procedures and normative tables were as follows, in priority order :

- Age appropriateness - tests that could be normed for all the ages of the children in the study.
- Sample appropriateness 1 - Australian norms could be applied to interpreting the tests (unfortunately the first criteria excluded many of the test items/batteries developed in Australia).
- Sample appropriateness 2 - failing the second criteria, Canada was selected as a similar population. USA came next as it was a ready source of normative data.
- Consistency - where higher criteria were satisfied, as many test items were selected from the same source as possible (e.g. CAHPER was used for 5 items), as well as protocols and norms from the same source.

Leg strength or power was assessed by the vertical (sergeant) jump test, as the more traditional test, i.e. the standing broad jump, had been used on the motor dysfunction test and during the screening procedures. Therefore, it was felt that an alternative indicator may have been of value. The flexed arm hang was used as an indicator of upper body strength in preference to a modified push-up test. Whereas, there is considerable variation in scoring for push-ups, the objectivity of the flexed arm hang is much better controlled. This would also support the adoption of the CAPHER test rather than the ACHPER Test, as the latter contains a modified push-up item.

RESULTS

Background on Body Build and Stature

Results of anthropometric measures taken on the children, proved them to be of ponderous build, with body composition high in subcutaneous fat and exhibiting some mechanical disadvantage in the proportions of their limb segments. Height, weight and skinfold readings all tended to characterise the group as large and/or overweight children, with few exceptions. Proportionality measures indicated that the Relative Sitting Height and Crural Indices of the group fell close to those of a normal population, while the Brachial Index readings suggested a considerable divergence from the norm. This disproportion in upper limb segments, coupled with excess body fat, would point to a predilection to mechanically inefficient movement patterns, even if all other parameters were considered normal. The excess levels of body fat would also disadvantage the group in the efficiency of their cardiovascular system, during physical activity.

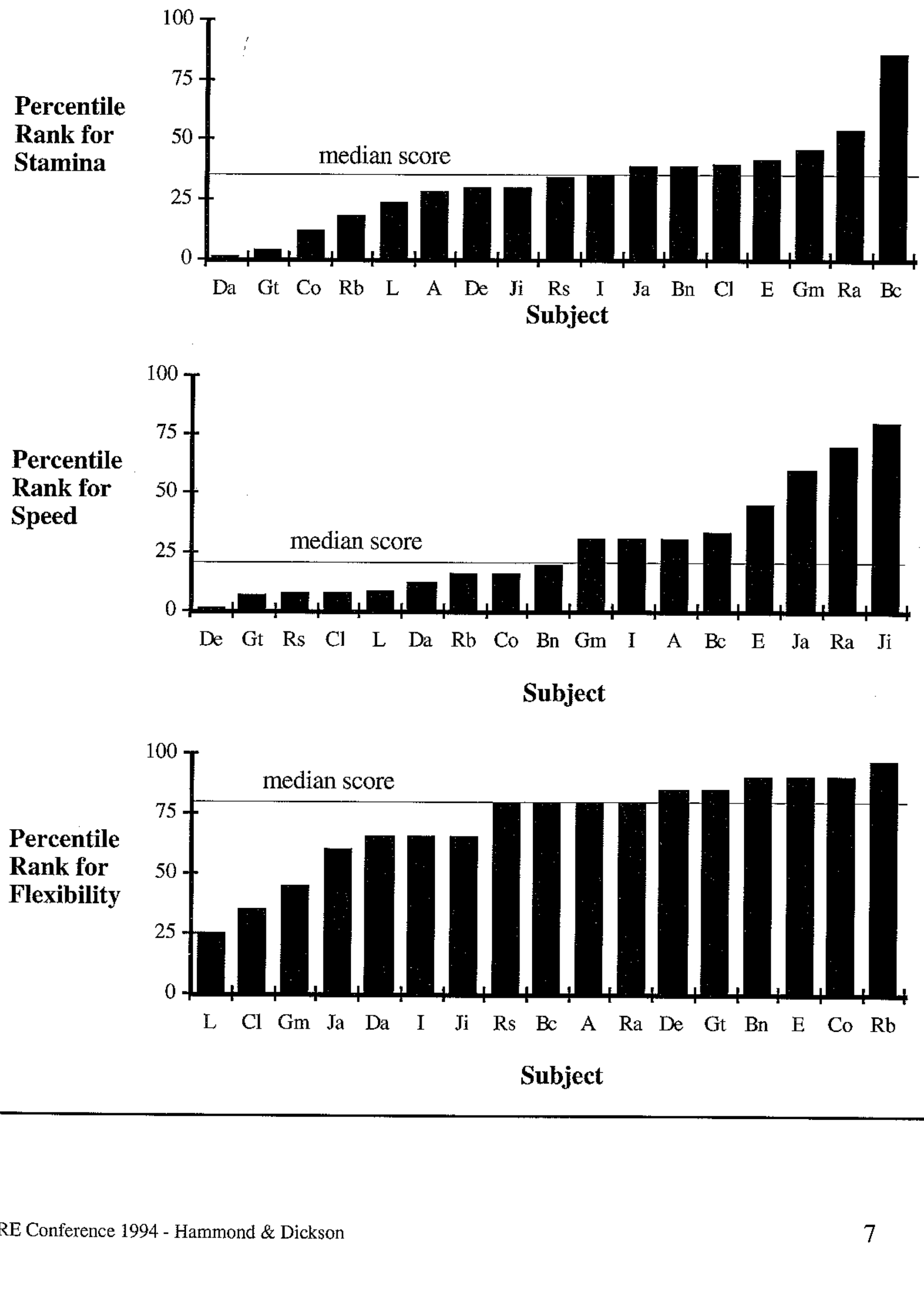
The results of measuring the fitness parameters can be seen as individual percentile rankings in Table 2. An illustration of these percentile rankings for the group is presented in Figures 1 and 2, indicating low fitness levels overall.

Table 2 : Percentile Rankings of Fitness Parameters

Name	Stamina	Flexibility	Speed	Abdominal Strength	Arm Strength	Leg Power
Jack	39	60	60	32	21	14
Ross	34	80	7	10	12	15
Graham	46	45	30	38	13	3
Lance	23	25	8	25	35	10
Bruce	39	90	19	14	25	40
Dennis	30	85	0	10	7	14
Darcy	0	65	12	4	3	36
Ivan	35	65	30	32	33	35
Robert	18	97	15	52	11	2
Brian	86	80	33	40	62	5
Jill	30	65	80	23	9	45
Ann	28	80	30	35	8	60
Greta	3	85	6	25	5	50
Rachel	54	80	70	75	57	65
Emma	41	90	45	70	16	25
Cloe	40	35	7	60	8	90
Connie	12	90	15	45	9	1
Median	34	80	19	32	12	25
Range	0 to 86	25 to 97	0 to 80	4 to 75	5 to 62	1 to 90

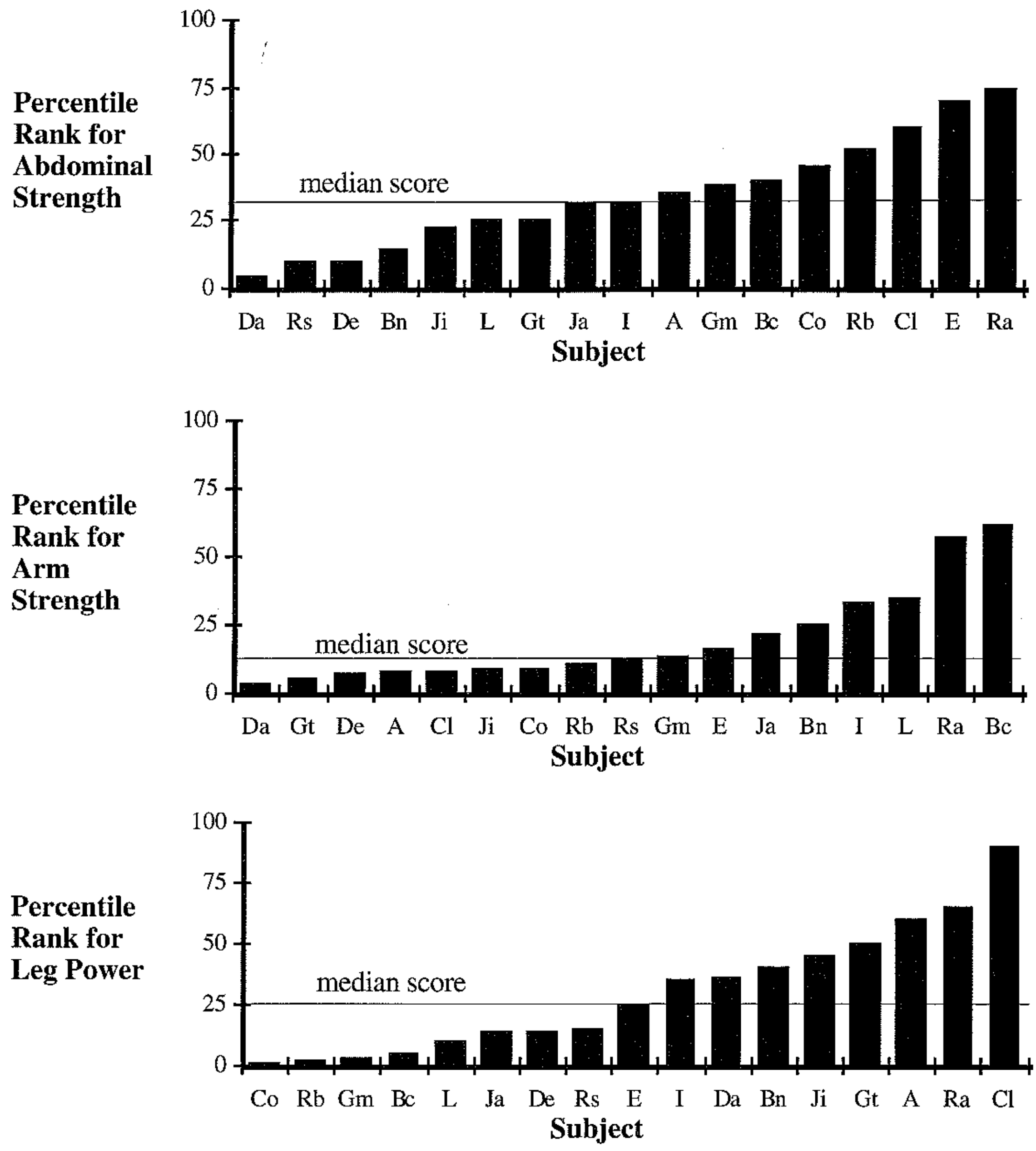
There are exceptions to this trend, both in subject profiles and in the single parameter of flexibility. However, it can be stated that the fitness level of the group, in general, is poor and would certainly detract from efficient physical performance. The only exception to the trend of low fitness, in terms of parameters measured, would be in the high levels of flexibility at the hip (see Figure 1). However, this result may well be esoteric, as flexibility can be a consequence of poor musculature.

Figure 1 - Stamina, Speed & Flexibility in Clumsy Children



Certainly, this group with its high levels of body fat and low levels of strength, would have a musculature so weak that it can allow a large range of joint movement. This phenomenon, of a "hyper-extensible" type in children experiencing movement difficulties, has been reported by Larkin (1994) from current research, as yet not formally documented. Considering these factors, the contrast in the magnitude of this parameter, compared to the other five, is not surprising.

Figure 2 - Strength & Power Indicators in Clumsy Children



There are three exceptions, in terms of subjects, which tend to be aberrations in deviation from the group trend (see Table 2). Brian and Emma would have a profile which is not completely acceptable but one which may be expected in a normal group of children. Only Rachel has a fitness profile that would be conducive to a reasonable level of physical performance. Otherwise, the children either have a profile which is consistently low over the six parameters, e.g. Graham; or have some parameters at an extremely low level, e.g. Greta. Given that there are only slight divergences, it would still be reasonable to reinforce the initial conclusion, that the fitness levels of the group are low.

DISCUSSION

The children in this study tended to be larger than their peers, with high levels of body fat and some mechanical disadvantages in their structure. The excess levels of body fat would disadvantage the children in two ways. Firstly, as a biomechanical disadvantage, in particular when combined with limb segment disproportionality but also combined with a lack of strength and hyperflexibility. Secondly, in combination with the low general or local endurance levels, would severely affect the efficiency of the cardiovascular system, during physical activity. In addition, the neuromuscular ability levels of the group are low and would further hamper efficient control of movement.

The fitness parameters evaluated, demonstrated that the fitness level of the group was low, detracting from efficient physical performance. With the exception of flexibility, all the fitness parameters measured, determined the group as lacking stamina, speed and strength. However, the high levels of flexibility present in most of the children, could possibly be attributable to meagre levels of musculature. As a consequence, this could also be disadvantageous, as hyperflexibility without a sound musculature, could allow too large a range of joint movement, with loss of muscular control. In addition, low levels of fitness in combination with the body fat levels evident in the study group, would predispose the children to a number of other health risks, not able to be enlarged upon within the scope of this paper.

Every child should be given the opportunity to reach their full potential both in and out of the classroom. If clumsy children are not given support and opportunity to participate in identification and remedial programs, then the system is not fulfilling its role of equality for all. The affect on the child with motor difficulties is more far reaching than just a lack of success in physical activity. The self-esteem of the child is negatively affected by their lack of physical prowess and children who have participated in remedial programs have shown considerable improvement in measures of global self-worth. If the children in this study were to continue with remedial work for the development of their motor skills, supplemented with fitness oriented activity, the downward spiral associated with movement difficulties may be broken.

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