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To establish normative data using the Jebsen Taylor hand function test (JHFT) for normal, ethnically diverse South Africans aged between 20 and 59 years

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CHAPTER 5
DISCUSSION

The purpose of this study was to establish normative data using the JHFT for a sample of normal, ethnically diverse South Africans aged between 20 and 59 years. The groups were shown to be comparable in terms of mean age and handedness. The study did not reflect the low incidence of 4% of left-handedness found in the Malawian and Asian populations by Zverey and Singh et al [75, 76]. It did however; indicate the trend for a higher incidence of left-handers in the White group. Handedness was not a variable considered in the analysis and discussion of this study.

The discussion will consider the comparison of the norms found for the sample in this study with those published by Jebsen et al [1] for the dominant and non-dominant hand of males and females. The variables of gender, dominant and non-dominant hand and ethnic group will be considered as well as the value of the JHFT as an outcome measure for use in South Africa.

5.1 Comparison to Jebsen et al Study

Using confidence intervals to compare this study with the original study, it appears that the South African sample were significantly slower lifting and placing light and heavy large objects but faster in the draughts subtest when comparing function in both hands (Table 4 p 36). It is of interest that both the tasks that scored significantly slower times for males and females for both hands, were the more gross motor tasks which involve grasp into the palm of the hand rather than fine pinches using only the fingers. The draughts item requires fine hand function and pinch between the fingers as well as co-ordination.

Card turning which also requires fine pinch, was slower for both males and females with both hands, with the females' non-dominant and the males' dominant hands being significantly slower (Table 4 p 36). The times for picking up small objects were

also identical to those found by Jebsen et al [1] except for the males' dominant hand that was faster.

When items like hand writing and feeding, which involve some in hand manipulation, were analysed, all the scores in this study were faster except for females and males writing with their dominant hand. Not all these differences were significant.
Thus, it is clear that in terms of activities requiring grasp, the South African sample was slower than the norms set by Jebsen et al [1] but for items requiring pinches and in hand manipulation the results are mixed. Although Jebsen et al [1] indicated the test addressed a number of aspects of hand function, they did not differentiate them into grasps, pinches and in-hand manipulation. They simply stated the items represented common everyday activities. The JHFT is a measure that uses time alone as an outcome. This is limiting in that the quality and method used, in prehension, as well as the type of grasp or pinch used is not recorded [10].

When considering other variables that could affect hand function, gender, the use of the dominant and non-dominant hand and ethnicity were included.
A variable of ethnic diversity was added to this study to establish whether race, genetic factors or culture would further affect the application of normative data in assessing hand function using the JHFT. Although education and occupation were not considered as factors that should be assessed in terms of hand function initially, the lack of information about these variables has become a limitation of this study. It is possible that occupations involving fine or gross motor function and familiarity with writing could have influenced the results found. Future studies should include further information on the eating habits of subjects, educational background, occupation, social status and the type of handedness in order to analyse the results more comprehensively.

5.2 Gender

Comparisons in terms of gender could be made to the Jebsen et al study [1]. They split their original norms for males and females as they found significant differences

between males and females on various subtests. The results of this study provide ongoing support for the separation of male and female norms. The lack of demographic information of the subjects used in the original study makes any further comparison in terms of any other demographic information impossible.

In terms of gender, the results for both this study and that of Jebsen et al [1] are consistent, in that females are faster in handwriting with both hands.
This study found men were faster at the feeding subtest with both hands. The scores for the draughts subtest in both hands were identical for males and females. Jebsen et al[1] found that females were faster for the small objects subtest with both hands but in the South African sample the males were slightly faster using their dominant hands for this task than the females. Overall females were slower on four of the seven subtests, had the same time for one subtest and were faster on two subtests.

Evidence in the literature also supports the female ability to complete fine dexterous tasks better with the non-dominant hand. The switching of dominant skills to the non dominant hand has been found to be more successful in females than males [81].
Women's times were also found to be much faster than men's in tests of fine co-ordination and manipulation for both the dominant and non-dominant hand similar to those required for handwriting[78]. Ruff and Parker [78] however, found women were substantially slower than men were when using both their dominant and non-dominant hands during the Finger Tapping test, a hand eye co-ordination measure. However, women have also been found to be slower on task completion, as they appear to be more cautious and tend to avoid errors, thereby resulting in a slower movement time [28].

The current study found significant differences in the time for the subtests for non-dominant handwriting and non-dominant lifting of light objects between the males and females. (Table 3 p 32). These findings appear to reflect the comment made by Jebsen et al [1] that differences they found between males and females followed no pattern that could be generalised.

5.3 Genetic factors

Genetic factors may provide some evidence to explain the differences found. It was noted however that males were slightly faster on the lifting and placing of light and heavy objects that require grasp rather than pinches in both studies. This perhaps could, be explained by inherent differences between the sexes. Males generally display greater muscle bulk and are therefore potentially stronger, resulting in greater comfort and speed when picking up objects, using a gross motor grip.
Andersen-Ranberg et al [(70)] also support the notion of differences across nations in aspects like handgrip strength that may be genetically determined factors. Kamarul et al [(71)] found western population grip strength to be as much as five times stronger than that of the Malaysian population. These kinds of differences may also apply in the area of lifting light and heavy objects with the dominant hand as Whites performed these tasks faster than Indians.

5.4 Dominant and Non-Dominant Hand

Research has also shown differences between dominant and non-dominant hand function[(73)]. It can be expected that the preferential use of activities or utensils, over time, allow for greater proficiency at a given task. Many authors suggest that handedness is a continuum from extreme left-handedness to extreme right-handedness. De Agostini et al [(73)] described ‘‘extreme right-handers’’ ‘‘strong right-handers’’, ‘‘weak right-handers’’ ‘‘mixed handers’’ and ‘‘left-handers’’ in which the distribution of men and women was not significantly different. The types of handedness may influence the results obtained in this study. No difference between dominance and hand preference resulting from these factors was established in the sample in this study, as questions about which hand is used and why, were not asked. This aspect may be of interest in future studies.

5.5 Ethnicity

A comparison of the four population groups did not result in any clear overall differences in terms of hand function on the JHFT.

When ethnicity is considered in relation to hand writing speed, only the Black and Coloured groups showed a significant difference in non-dominant hand writing speed between genders. Males in the Coloured group were also significantly slower for dominant hand and non-dominant handwriting speed (Table 7 Appendix F). In the White and Indian group the males were faster in dominant hand writing than the females and only slightly slower in non dominant writing, which is contrary to the findings of Jebsen et al[1].

There is no clear explanation for these findings, except that handwriting is a learnt skill. In South Africa were education and training opportunities between the various population groups were previously based on race, the results may be a reflection of this difference.

An individual's level of education may have an effect on the speed with which they can complete fine manipulative tasks. This study did not screen educational level as part of the initial screening, so no comparison in terms of this factor could be made, limiting further interpretation of these results.

Ethnicity can influence dominance [74, 75] and the current study indicates that there are statistically significant differences between the races for three of the subtests viz the dominant and non-dominant hand feeding subtest as well as dominant hand use in picking up light objects (Table 7 Appendix F). The differences may be related to cultural differences, rural or urban lifestyles, educational background and social status. All these factors may influence the degree to which hand function develops and the maintenance of that function. Literature from Malawi [75] shows definite cultural and ethnic differences in terms of eating, writing and enforced use of the right hand for these activities irrespective of dominance. Studies show that pressure to change to using of the right hand was higher for eating [74] than for any other activities. The pressure to write with the right hand was reduced for younger subjects showing more tolerance for the use of the left hand when writing [85].

The significantly slower scores for feeding found in the Indian population with the non dominant hand, may be explained by the strong pressure against left-hand eating that exist particularly in Muslim communities[76]. It is not clear which hand the two left hand Indian subjects used to eat with or what their religion was as this information was not collected. Although this small number did not affect the overall results, it was found that males in the White and Indian groups also performed the feeding subtest more slowly than their female counterparts (Table 7 Appendix F). The importance of these aspects in a study of this type have been realised and demographic data of this type should be collected in any future study.

In the subtest of feeding, the use of different types of utensils may account for differences found, as many individuals continue to eat with their hands or a spoon rather than the traditional Western approach of using cutlery bilaterally. From this study, it is not possible to account for the significant difference found between the Black and White groups for the dominant hand-feeding subtest. Subjects from the black population group were faster than subjects from the white population group and the Black group's scores were much faster than the norms set by Jebsen et al[1]. The JHFT does not look at quality and ease of use of cutlery or the type of food used in the test and subjects in this study were not asked how they eat

At present, it is difficult to either explain the differences between population groups or attribute a specific cause. It is useful to note the presence of differences however, as differences between gender and population groups affect the norms used in the JHFT. Whereas in the past only the differences in gender have been noted, the current study highlights the need to consider ethnicity and socio-cultural background of the individual being assessed, if comparisons to norms are to be used.

Jebsen et al used 300 subjects in the original study. The use of 120 subjects in this study renders a 95% confidence interval when composite figures are used. The differences between population groups however are based on a limited number of 30 individuals in each population group. Since differences in the groups were identified,

it is clear that norms for an entire South African population cannot be extrapolated and verified as being different for each population group. This study only established a trend. Larger numbers would need to be assessed.

5.6 Use of the Jebsen-Taylor hand Function Test in South Africa

This study highlights the complexity of standardised tests and the care with which results should be interpreted, as well as the fact that other personal or environmental factors can influence the findings. The value of the JHFT as an outcome measure to be used by occupational therapists in South Africa is reviewed according the instrument evaluation framework by Rudman and Hannah[6] referred to in Chapter 2..

5.6.1 Clinical Utility

In terms of clinical applicability, the comparison of hand function to norm references is not advised as the norms established in this research have shown that those published by Jebsen et al [1] are probably not applicable to the South African population. It would be more appropriate to compare the JHFT times obtained clinically, in patients with hand function deficits over time, as the patient improved.

The JHFT is specific in that it has been used internationally with a wide range of diagnoses and has been shown to be sensitive to changes in hand function in all of these including rheumatoid arthritis,[26,27,35] traumatic hand injuries[28,29] and stroke patients [12,13,25,86] in particular. It can be assumed that it can be used with all diagnoses where it is necessary to assess and treat hand function in South Africa as well.

The test is not readily available for use in South Africa and would need to be ordered from the USA [46] or the United Kingdom [45]. This can be done online using the internet. However the test can be constructed by therapists according the guidelines stipulated by Jebsen et al[1] but it may be necessary to buy the wooden draughts from overseas suppliers. This does make the test affordable even in South Africa

where the exchange rate and limited funds in some occupational therapy departments limit the use of standardised tests.

The JHFT is easy to administer but may take longer than 20 minutes to administer if patients have severely limited hand function. This may present a problem in very busy occupational therapy departments where occupational therapists are pressed to complete even basic assessments of performance components.

The acceptability of the test to patients may also present a problem. The activities the subtest items simulate, especially writing, page turning and feeding with a spoon [7] may not be commonly used by all South Africans as everyday activities. The assessment of these items with the non-dominant hand could present a problem of acceptability wherever the test is used.

Stacking draughts does not really simulate any everyday activity and was considered by Jebsen et al [1] to be the least functional of the subtests in terms of ADL. Thus, patients may not accept the test or be able to understand the relevance of performing the items that are included in the test. The test is available in English only, which can also be problematic in the ethnically diverse country of South Africa.

5.6.2 Standardisation

The JHFT does come with instructions administration, procedure, scoring, interpretation and criteria for equipment setup [1] which are easily understood and can be used by South African occupational therapists.

The JHFT is a descriptive hand function assessment [6] with a broad range of items to differentiate between persons with and without hand injuries. The outcome of the test is measured in time only [1] and although co-ordination, dexterity and various types of prehension are implicit in the test these have to be measured by other means if they are to be evaluated. The patient may complete the JHFT within the time norms set, without having full range of motion of the shoulder and elbow joints. It was observed

that the tasks did not require the subjects to move through a full range of movement at these joints.

The good test retest reliability [1, 51] of the JHFT means that the test can be used over time to show improvement in hand function of any given patient. This together with the high intra-rater, inter-rater reliability [5, 6, and 51] allows the records of the same or a different therapist to be used to assess the outcome of therapy on the same patient. Such outcomes allow communication between therapists in terms of the patient's abilities. Practice of individual items may be an issue as some items do include skills, which can be improved by practice [49].

Although there is support for the construct validity of the JFHT [51] the lack of bilateral items does limit the relationship to a number of ADL tasks [52]. The use of the non-dominant hand to write and the stacking of draughts affect the content validity internationally as these are not activities normally done with the non dominant hand[7]. Eating with a spoon with the dominant and non-dominant hand and cursive writing in English, may be a factor when using the test in South Africa. A thorough history of the patient would allow the South African therapist to judge the suitability of the JHFT items in terms of the patient's context. The original norms for the JHFT [1] appear to be unsuited to the South African population between 20-59 years of age as discussed above.

6.5.3 The Patient's Perspective

In accordance with occupational therapy philosophy, the therapist needs to be aware of the patient's context and all other factors that may affect the patient's performance. A standardised assessment like the JHFT does not consider the patient's perspective but may be used to allow the patient to see concrete evidence of improvement in hand function over time. This can be very motivating for the patient.

Concerns about the suitability of the JHFT test for use by South African occupational therapists centre on the clinical applicability in terms of the subtests content validity,

lack of bilateral tasks and the patient's perspective. This study has shown that the test may not be suitable in its present format for all patients due to cultural and ethnic differences in ADL.

The norms provided by Jebsen et al [1] are significantly different from those established for the South African sample in this study and it cannot be assumed that Jebsen et al's [1] published norms can be applied when assessing hand function with the JHFT in this country.

Advantages of using the test in the South African context are that it is one of the few affordable standardised tests, with sound psychometric properties, that can be constructed by the therapist. No training is required to administer the test, which can take as little as 15 minutes to complete. The test can be used to determine improvement or change in hand function in a variety of different diagnoses.