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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 4
RESULTS

The JHFT was carried out on 120 subjects in Durban, South Africa. Thirty subjects, between the ages of 20 and 59 years, were selected from each of four population groups, with an equal number of males and females in each group.

4.1 DEMOGRAPHICS

4.1.1 Age

The table below represents the average age and standard deviation for the four different populations groups and separated by gender for each group.

Table 1. Age Demographics of sample according to Population Group and Gender

	Age range 20-59 years			
	Black	**Coloured**	**Indian**	**White**
Total No of Subjects	30	30	30	30
Mean age	34.83	37.40	37.23	37.23
SD	10.12	12.32	12.12	8.54
Total No of Males	15	15	15	15
Mean age of Males	36.73	35.67	38.60	37.07
SD	11.19	13.94	11.54	8.58
Total No of Females	15	15	15	15
Mean age of Females	32.93	39.13	35.87	37.40
SD	8.89	10.66	12.93	8.79

The mean age of the total sample of 120 subjects ranged from 34.83 to 37.40 years within the four population groups. The 60 female subjects had a median age of 36.43 years and a mean age of 35.16 years, whereas the male subjects had slightly lower median age of 35 years and a slightly higher mean age of 37.02 years.

There was no significant difference in the age range between genders for the total sample (p= 0.73) within any of the population groups. Since Jebsen et al[(1)] did not publish any further data on the demographics of the sample used in the 1969 study no further comparisons could be made.

4.1.2 Handedness

The incidence of left-handed subjects in this study is below the worldwide average (Table 2). Subjects were chosen using population group, as a factor in sampling and dominance was not a factor considered. The JHFT records scores under dominant and non-dominant columns.

Table 2. Handedness in the sample and the population groups

	World wide	Current study	Black	Coloured	Indian	White
Incidence of L Hand Dominant	10%	7.5%	6.7% n =2	6.7% n =2	6.7% n =2	10% n=3
Incidence of R Hand Dominant	90%	92.5%	93.3% n=28	93.3% n=28	93.3% n=28	90% n=27

Jebsen et al [(1)] made no mention of the incidence of dominance in their study. When the handedness in the four ethnic groups was compared, this study found no significant difference in incidence of right and left-handedness between the groups. (p=0.95).

4.2 DIFFERENCES IN RESULTS BETWEEN GENDERS

The results were divided into scores for male and female. Using a standard t- test to compare male and female scores, the current study found no significant difference in any of the subtests except those of handwriting and lifting light objects for the non-dominant hand. Table 3 below illustrates the composite findings between males and females for all population groups.

Table 3. Composite findings for all genders across the items on the Jebsen Taylor Hand Function Test

	Females		**Males**		t- Test
	Mean	**Sd**	**Mean**	**Sd**	
D handwriting	12.71	4.41	13.89	5.58	0.201
D page turning	4.94	1.19	4.73	1.21	0.331
D small objects	5.59	1.16	5.53	0.93	0.77
D feeding	6.28	1.13	6.11	1.02	0.40
D draughts	2.38	0.49	2.37	0.60	0.9
D light objects	3.65	0.72	3.54	0.62	0.39
D heavy objects	3.80	0.65	3.63	0.60	0.14
ND handwriting	28.57	9.07	32.24	10.46	0.04*
ND page turning	5.59	1.31	5.76	1.40	0.49
ND small objects	6.12	1.52	6.20	1.18	0.72
ND feeding	7.56	1.44	7.39	1.42	0.52
ND draughts	2.72	0.60	2.72	0.68	0.94
ND light objects	4.02	0.81	3.70	0.67	0.02*
ND heavy objects	4.11	0.9	3.91	0.77	0.18

The mean difference is significant at the .05 level

The difference between the genders in each population group was also considered. Statistically significant differences were found for some items between males and females in the Black and Coloured population groups.

Males and females in the Black population showed statistically significant differences when compared to those for the total sample in the subtests of non-dominant handwriting (p= 0.02) and non-dominant lifting light objects (p=0.02). (Table 6 Appendix F)

The significant differences found between the males and females in the sample of the Coloured population were for the subtests of dominant (p= 0.04) and non-dominant handwriting (p= 0.03).

No statistically significant differences were found in the male and female samples of the Indian or White population groups. The above results suggest that male and female norms reinforce the need to keep separate norms for the genders, as some aspects do still demonstrate significant differences.

4.3 COMPARISON OF THE TEST RESULTS BY DOMINANT HAND AND NON DOMINANT HAND

Table 4 below illustrates the mean times (in seconds) and standard deviations for the 120 South Africans displaying dominant and non-dominant speed of function.

Table 4. Norms for the South African Sample for the Jebsen-Taylor Hand Function Test

	Dominant Hand				**Non dominant Hand**			
	Females		**Males**		**Females**		**Males**	
	Mean	**sd**	**Mean**	**sd**	**Mean**	**sd**	**Mean**	**sd**
Handwriting	12.7	4.41	13.89	5.58	28.6	9.07	32.24	10.46
Page turning	4.94	1.19	4.73	1.21	5.59	1.31	5.76	1.4
Small objects	5.59	1.16	5.53	0.93	6.12	1.52	6.2	1.18
Feeding	6.28	1.13	6.11	1.02	7.56	1.44	7.39	1.42
Draughts	2.38	0.49	2.37	0.6	2.72	0.6	2.72	0.68
Light objects	3.65	0.72	3.54	0.62	4.02	0.81	3.7	0.67
Heavy objects	3.8	0.65	3.63	0.6	4.11	0.9	3.91	0.77

The mean scores found in this study for the dominant and non-dominant hand for males and females were compared to those found by Jebsen et al [(1)].

4.3.1 Comparison to Jebsen et al's means for the dominant hand

When comparing the dominant hand function of females in this study to the Jebsen et al's [1] norms, it was found that the subtests of handwriting, light and heavy objects were done more quickly in the original Jebsen et al[1] study. No difference was noted in the subtests of page turning and small objects. The feeding and draughts subtests were completed more slowly in the original data set when compared to the times recorded in this study (Figure 1). When looking at dominant hand function in males, four out of seven subtests were completed in slower times in the present study than in the original Jebsen et al [1] study.

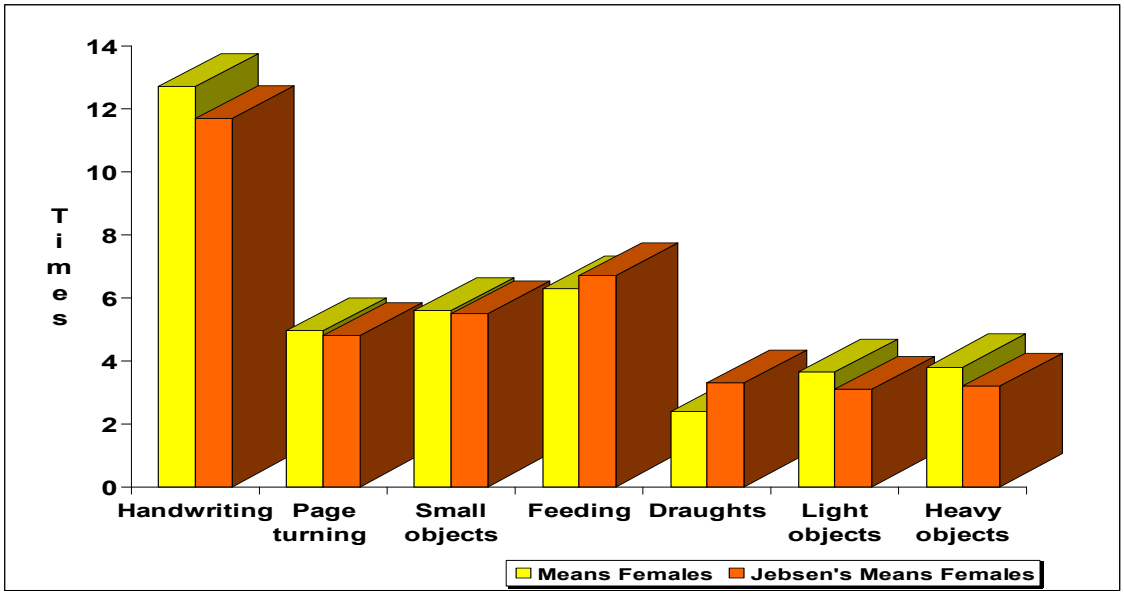


Figure 1 Comparison of means between this study and Jebsen et al's means for females' dominant hand

Males scored faster times in the small objects, feeding and draughts subtests in this study, when compared to the norms for males in the original Jebsen et al [1] study (Figure 2).

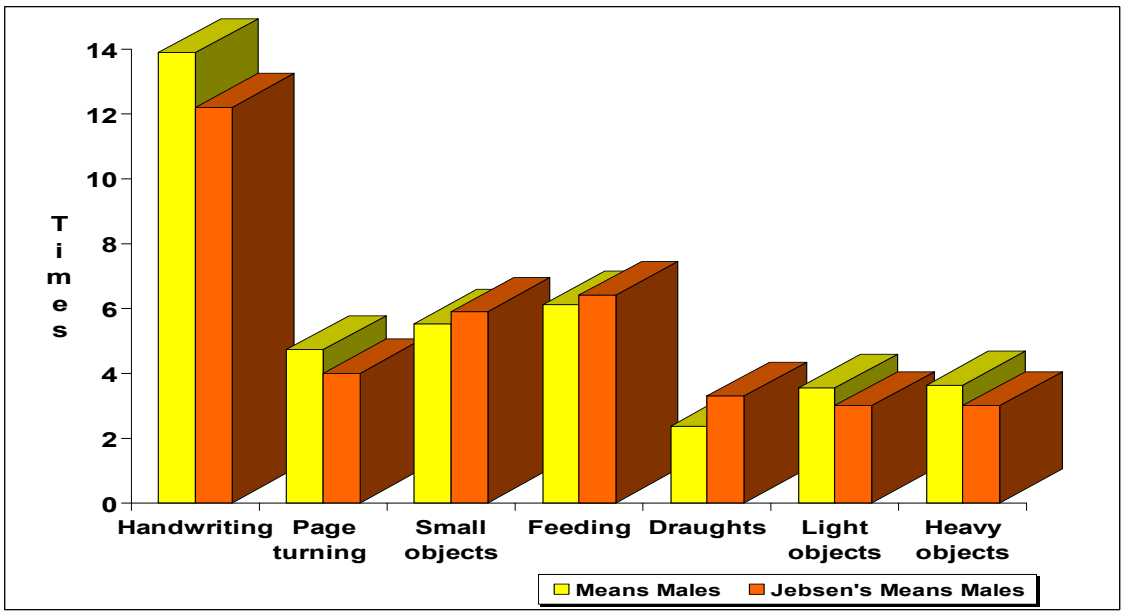


Figure 2 Comparison of means between this study and Jebsen et al's means for males' dominant hand

4.3.2 Comparison to Jebsen et al's means for the non-dominant hand

A mixed picture was again noted when comparing non-dominant hand function between males in this study compared to males in the Jebsen et al study [1]. The same was found when comparing the female norms in the current study to the females in the Jebsen et al study [1].

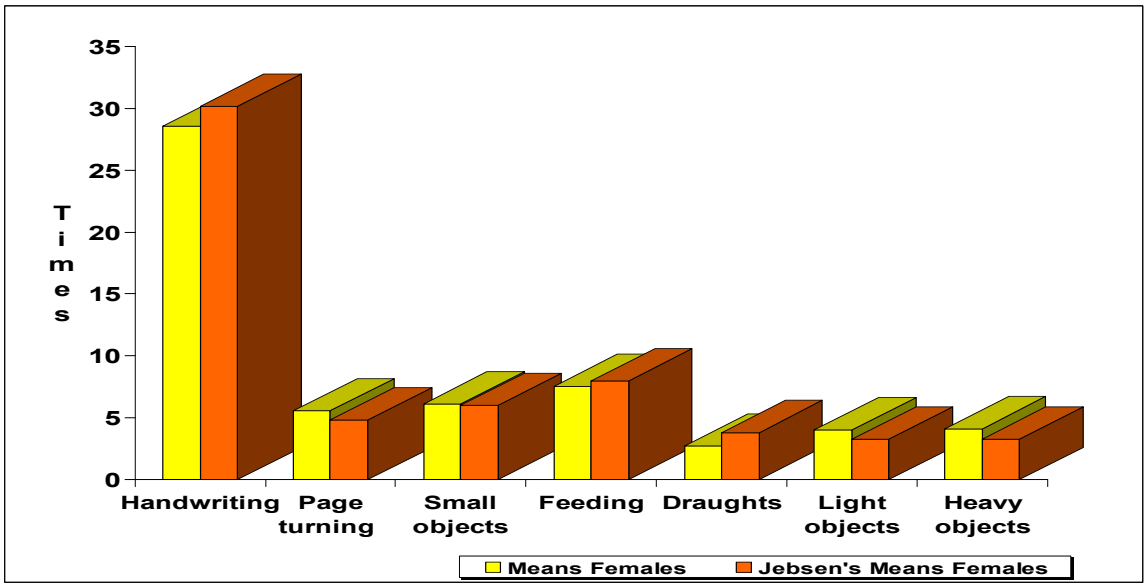


Figure 3 Comparison of means between this study and Jebsen et al's means for females' non-dominant hand

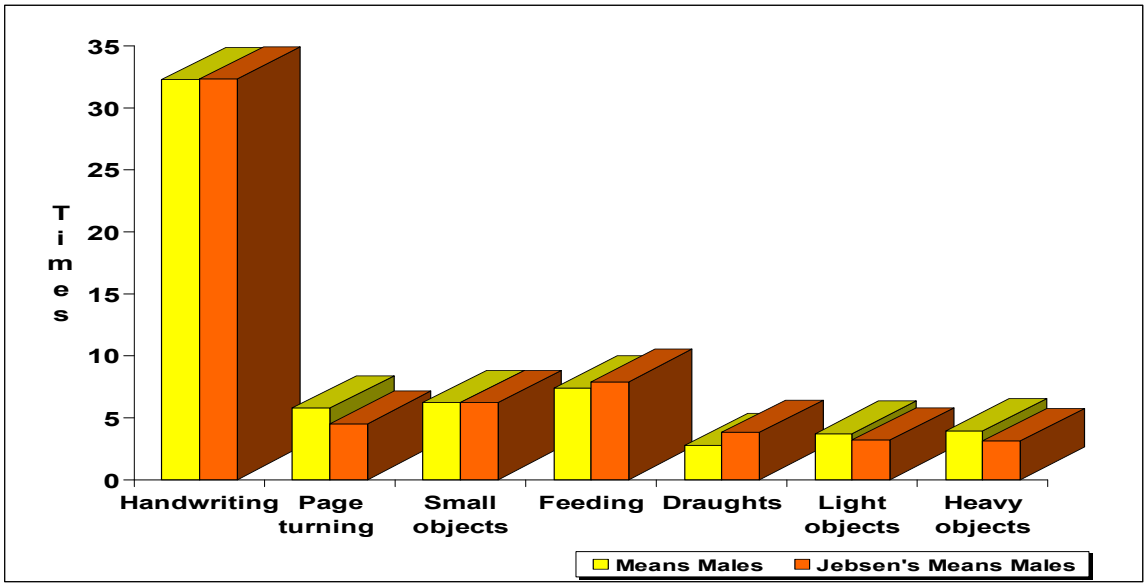


Figure 4 Comparison of means between this study and Jebsen et al's means for males' non-dominant hand

When looking at females non-dominant hand function, only the handwriting, feeding and draughts subtests were faster in the current study (Figure 3). Page turning, lifting and placing light and heavy objects were faster in the original Jebsen et al [(1)].study. Males, however, only recorded faster times in draughts and feeding subtests with their non-dominant hands in the current study, when compared to the Jebsen et al [(1)] study (Figure 4).

4.3.3 Comparison to Jebsen et al's means using Confidence Intervals

Confidence intervals were used to compare the mean values obtained in this study with those obtained by Jebsen et al [(1)]. If the confidence interval includes zero we can say that there is no significant difference between the means of the two populations. In this case at a level of confidence of 95% was used, and all subtest results that included a zero indicated that the interval between Jebsen st al's[(1)] means and those found for the South African sample had a true significant difference between them [(84)].

Table 5. Confidence Intervals for the means found by Jebsen et al and the means in this study

	Females		**Males**	
	Dominant Hand	Non Dominant hand	Dominant Hand	Non Dominant hand
Hand writing	-2.26 to 2.04	-1.57 to 4.83	-3.37 to -0.01*	-3.67 to 3.79
Page Turning	-0.06 to 0.33	-1.23 to -0.35*	-1.12 to -0.34*	-1.69 to -0.83*
Small objects	-.045 to 0.27	-0.59 to 0.35	0.02 to 0.72*	-0.38 to 0.38
Feeding	0.2 to 0.82*	-0.11 to 0.99	-0.06 to 0.64	0.02 to 1.00*
Draughts	0.72 to 1.1.2*	0.84 to 1.32*	0.69 to 1.17*	0.85 to 1.31*
Light Objects	-0.77 to -0.33*	-0.98 to -0.46*	-0.73 to -0.35*	-0.73 to -0.27*
Heavy Object	-0.81 to -0.39*	-1.07 to -0.55*	-0.83 to -0.43*	-1.05 to -0.59*

- *indicates a significant difference between the means of the two studies

All subjects were significantly faster at the draughts subtest, in this study but slower at lifting the light and heavy objects with both hands, than the population studied by Jebsen et al[(1)]. The results for writing and page turning indicated that only men were significantly slower at both subtests with their dominant hand. Both males and females were significantly slower in turning pages with their non dominant hands in this study than in the original Jebsen et al study [(1)] (Table 5). In small object placement males were significantly faster, with their dominant hands, in this study, as were females for the feeding subtest. Males were significantly faster at feeding with their non-dominant hands.

4.4 COMPARISON OF THE TEST RESULTS BY POPULATION GROUP

Means and standard deviations were calculated for each of the population groups and the results were analysed using analysis of variance (ANOVA). The results after the Bonferroni correction to control for type one error, demonstrate the specific

differences in each subtest between population groups. Statistically significant differences were found between the means of the population groups for three subtests viz dominant hand feeding, dominant hand use picking up light objects and non-dominant hand feeding.

In terms of dominant feeding, the statistically significant differences (p=0.01) appear to be between the Black and White population groups. Statistically significant differences (p=0.03) in the subtest of dominant light objects, occur between the Indian and White population group.

Table 6. Composite results for all population groups across the items on the Jebsen Taylor Hand Function Test

	Mean	**Standard Deviation**	**ANOVA**
D handwriting	13.30	5.04	0.15
D page turning	4.84	1.20	0.81
D small objects	5.56	1.05	0.89
D feeding	6.20	1.08	0.01*
D draughts	2.38	0.55	0.28
D light objects	3.59	0.67	0.04*
D heavy objects	3.71	0.63	0.18
ND handwriting	30.40	9.92	0.14
ND page turning	5.68	1.35	0.43
ND small objects	6.16	1.35	0.26
ND feeding	7.47	1.43	0.00*
ND draughts	2.72	0.63	0.12
ND light objects	3.86	0.76	0.17
ND heavy objects	4.01	0.84	0.12

* The mean difference is significant at the .05 levels

In the non-dominant feeding subtest, more than one statistically significant difference occurred between the Indian population group and all three of the other population groups:

Table 7 Composite Mean and Standard deviation for Sample of all Population Groups for all subtests

	White		Indian		Coloured		Black	
	Females	Males	Females	Males	Females	Males	Females	Males
D handwriting	12.46 +- 3.25	10.84 +- 3.73	14.12 +- 5.87	12.47 +- 2.90	11.66 +- 2.76	15.70 +- 4.93	12.60 +- 5.09	16.54 +- 7.82
D page turning	5.12 +- 1.30	4.66 +- 1.49	4.65 +- 1.12	4.89 +- 1.02	4.79 +- 1.18	4.61 +- 1.05	5.22 +- 1.17	4.75 +- 1.34
D small objects	5.21 +- 1.03	5.71 +- 1.12	5.82 +- 1.01	5.39 +- 0.67	5.59 +- 1.03	5.45 +- 0.92	5.72 +- 1.49	5.58 +- 1.03
D feeding	6.44 +- 1.03	6.61 +- 0.83	6.32 +- 1.36	6.49 +- 0.92	6.51 +- 1.10	5.83 +- 1.11	5.86 +- 0.98	5.53 +- 0.88
D draughts	2.41 +- 0.42	2.18 +- 0.67	2.57 +- 0.56	2.50 +- 0.65	2.20 + 0.34	2.40 +- 0.54	2.36 +- 0.58	2.40 +- 0.56
D light objects	3.34 +- 0.75	3.31 +- 0.61	3.85 +- 0.59	3.77 +- 0.74	3.63 +- 0.56	3.68 +- 0.54	3.76 +- 0.91	3.41 +- 0.51
D heavy objects	3.57 +- 0.64	3.54 +- 0.51	3.94 +- 0.61	3.86 +- 0.69	3.75 +- 0.62	3.75 +- 0.64	3.93 +- 0.73	3.36 +- 0.48
ND handwriting	26.98 +- 9.69	27.68 +- 10.92	32.99 +- 9.31	33.15 +- 10.06	26.57 +- 6.82	33.04 +- 9.94	27.72 +- 9.52	35.10 +- 10.45
ND page turning	5.56 +- 1.45	5.27 +- 1.33	5.72 +- 0.92	6.05 +- 1.24	5.36 +- 1.29	5.72 +- 1.18	5.73 +- 1.58	6.01 +- 1.76
ND small objects	5.39 +- 1.30	6.18 +- 1.33	6.73 +- 1.20	6.1 +- 1.10	6.02 +- 1.53	6.19 +- 1.22	6.33 +- 1.78	6.35 +- 1.16
ND feeding	7.17 +- 1.57	7.33 +- 1.32	8.29 +- 1.48	8.27 +- 1.34	7.47 +- 0.92	7.07 +- 1.48	7.29 +- 1.58	6.88 +- 1.23
ND draughts	2.58 +- 0.43	2.54 +- 0.68	2.96 +- 0.76	2.80 +- 0.71	2.51 +- 0.53	2.72 +- 0.50	2.85 +- 0.55	2.81 +- 0.81
ND light objects	3.82 +- 0.96	3.75 +- 0.75	4.28 +- 0.78	3.95 +- 0.72	3.85 +- 0.64	3.80 +- 0.53	4.11 +- 0.82	3.30 +- 0.51
ND heavy objects	3.86 +- 0.81	3.72 +- 0.79	4.33 +- 0.96	4.27 +- 0.98	3.96 +- 0.70	4.03 +- 0.53	4.29 +- 1.07	3.61 +- 0.60

* measured in seconds

Black population group (p=0.01), Coloured population group (p=0.03) and White population group (p=0.03).

Tables 6 and 7 above illustrate the composite and population group results for all population groups. The results suggest that within the South African context, norms need to be separated according to population grouping for at least three of the subtests.
Due to the lack of specific demographic information in the original work done by Jebsen et al [1], it is difficult to further compare the current sample with their study.

4.5 SUMMARY OF RESULTS

The results suggest that it is valuable to continue using separate male and female norms as recommended by the original work done by Jebsen et al [1]. Comparison of population groups with the original work was not possible due to a lack of information regarding the ethnic composition of the original group. The results further suggest that it would be valuable to consider having separate norms for different population groups in certain areas where statistically significant results are apparent eg. in the subtest of feeding.

Norms for this sample of 120 South Africans have been established as being statistically different in enough items to indicate that the original Jebsen et al [1] norms cannot be used without concern. Their applicability when using the JHFT to assess a South African population between the ages of 20 – 59 years must therefore be questioned.