

Foot-Length Asymmetry, Sex, and Handedness

Levy and Levy (1) found that right-handed males had longer right feet and right-handed females had longer left feet, while the reverse relationship occurred in non-right-handed individuals. We have analyzed data obtained and classified primarily for other purposes to see if the data support Levy and Levy's conclusion.

Our sample consisted of 146 undergraduates, 56 percent of whom were male. Handedness was categorized into two classes, right and left, on the basis of writing hand. The classification of handedness is controversial, but McManus (2) has shown that a person's handedness is best assessed by means of the hand used for writing, provided that no forced change of writing hand had occurred. We therefore excluded five persons who experienced such a history from the analysis. The distribution of handedness by sex did not differ between our study and that of Levy and Levy.

Foot length was measured by standard anthropometric technique (3). All measurements were taken by one of us (A.M.M.) without prior knowledge of the subjects' handedness.

For the total sample, length of the left foot (L) exceeded that of the right foot (R) measured by both absolute length [$L = 257.76 \text{ mm} \pm 1.48$, $R = 256.99 \text{ mm} \pm 1.42$; paired t (280) = 2.62, $P < .01$] and standardized length of $100(L - R)/(L + R)$ (4) (mean, 0.140 ± 0.057 ; $t = 2.46$, $P < .02$). This finding that $L > R$ is in agreement with previously published results of either paired comparisons of foot length of adults and fetuses (5-8) or measures of osteological asymmetries (9-11), but is in the opposite direction to Levy and Levy's findings for males (12).

Analysis of variance of $100(L - R)/(L + R)$ by handedness and sex showed no evidence of a main effect due to handedness [$F(1, 137) = 0.112$, $P = .738$]. In agreement with the work of Garn *et al.* (13), there was no sex-handedness interaction [$F(1, 137) = 1.174$, $P = .280$]. The main effect of sex was significant [$F(1, 137) = 3.934$, $P = .049$]; previous studies have found a similar trend (6, 7).

The mean foot-length differences for each study by sex and handedness are shown in Table 1. Because of measurement differences between studies, it is difficult to compare our results with

Table 1. Mean foot-length asymmetry (L - R) by sex and handedness. The number of subjects in each cell is shown in parentheses.

Sex	Right-handed		Non-right-handed	
	Cam-bridge	Levy and Levy	Cam-bridge	Levy and Levy
Male	+0.26 (62)	-1.2 (40)	+0.20 (17)	+1.1 (12)
Female	-0.02 (56)	+0.9 (87)	+0.29 (6)	-1.4 (11)

Levy and Levy's directly. However, sign differences indicate that our results are in the opposite direction.

Our failure to replicate Levy and Levy's findings of a sex-handedness interaction could be due to many factors, but at least sample sizes and distributions of right- and non-right-handers were similar in the two studies. The major difference was one of methodology. Our results were obtained from a recognized anthropometric and quantitative approach, whereas Levy and Levy used a rating method and a less quantitative analysis.

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References and Notes

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