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Handedness and Physical Measures II: Objectively Measured Height and Weight

Propper RE[1*], **Struble CA**[1] **and Brunyé TT**[2]

[1]*Psychology Department, Montclair State University, 1 Normal Avenue, 225, Dickson Hall, Montclair, NJ, 07043, USA*

[2]*Tufts University, Psychology Department, Medford, MA, USA*

[*]**Corresponding author:** Ruth E. Propper Psychology Department, Montclair State University, 1 Normal Avenue, 225, Dickson Hall, Montclair, NJ, 07043, USA, Tel: 973 655-5201; E-mail: propperr@mail.montclair.edu

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Abstract

There is conflicting literature on the relationship between hand preference, height, and weight, with some research indicating increased height in non-right-handers, and others supporting both decreased height and decreased weight in this population. However, no previous research has objectively measured height and weight, examined a predominantly female population, or explicitly explored the contribution of handedness degree versus handedness direction in investigations. The present research objectively assessed height and weight in a sample of individuals with a range of hand preferences. Results: Left-handers were shorter than right-handers, but weighed the same. Left-handers therefore demonstrated a higher body mass index than right-handers. Conclusion: Results suggest handedness direction is related to objectively measure anthropomorphic characteristics in women. Because the current sample was predominantly female, future research could determine if the present findings reflect true gender differences in the relationship between height, weight, and handedness, or limitations of sample size.

Keywords: Handedness; Anthropomorphic; Height; Weight

Introduction

A relationship between hand preference and self-reported height was recently reported [1], such that increasing consistency of handedness (i.e.: consistency with which one hand is chosen across a variety of tasks; consistent- versus inconsistent-handedness) was associated with decreasing stature in men, but not in women. Furthermore, inconsistently-handed individuals were significantly taller than consistently-right-handed individuals, and numerically taller than consistent-left-handers. Direction of hand preference (i.e. left- versus right-handedness) was not related to self-reported height. Similarly, Tan [2], presumably using self-reported measures of height, found that as either consistent-right- or consistent-left-handedness increased, height decreased.

Self-report measures may not accurately reflect height or weight [3]. For example, there are individual differences in over- and under-estimation of these self-report measures [4]. In fact, individual differences in hand preference may influence self-reported body measures [5]. For instance, consistently-right-handed individuals demonstrated a greater difference between self-reported and measured body mass index (BMI) compared to inconsistently-handed individuals. Given that BMI is calculated from height and weight, it is possible that there are systematic individual differences in handedness effects on these latter measures, as well. Propper, Brunyé, Hrank, and McGraw [1] and Tan [2], by examining self-report measures, may have over-estimated differences between handedness groups in actual height. Thus in the present work, height (and weight, see below) was objectively measured.

Work also suggests individual differences in handedness effects on weight, such that left-handers weigh less than right-handers [6,7,8,9]. However, all of these prior studies examined archival records of sports figures, and used only one or two measures to categorize hand preference (e.g.: pitching hand) based on direction. Consistent-left-handers comprise only about 2 – 3% of the population [10], meaning it is therefore possible that these previous works confounded handedness degree and handedness direction. It is becoming increasingly clear that both handedness direction and degree contribute to between-subject variation in cognitive and physiological measures [11], and are likely to contribute to individual differences in handedness effects on weight as well. In support of this possibility, work by Tan [2] and Propper, Brunyé, Hrank, and McGraw [1] suggest that it is degree of handedness, not necessarily direction, that is related to height. Such results may also generalize to weight.

Although not explicitly stated in all the above archival studies, given that the records examined are those of professional sports figures (e.g.: Major League pitchers, professional cricketers), the population is certainly predominantly, if not entirely, male. Gender interacts with effects of handedness on brain morphology [12], it is possible that any relationship between anthropomorphic characteristics and hand preference may not be generalizable between men and women. Supporting this possibility is that Propper, Brunyé, Hrank, and McGraw [1] reported a relationship between self-reported height and handedness in men, but not women.

From a theoretical perspective, understanding the relationship between individual differences in handedness and anthropomorphic characteristics can help to elucidate the relationship of both these variables with exposure in utero and during childhood development to androgens (e.g.: testosterone and estrogen). From a practical perspective, such information may offer decrease apparel-time-to-selection in situations wherein time is limited (e.g.; military uniforms). To summarize, the present work investigated handedness and objectively measured height/weight relationships in a predominantly female sample.

Method

Participants

228 participants (187 women), ranging in age from 18 to 45 years-old (M=19.62, SD=3.18), participated for 1 SONA credit in a Psychology course after reading and signing an Informed Consent. The research was approved by the Montclair State University IRB and the Army Human Research Protection Office.

Apparatus and procedure

As part of a larger protocol, participants were tested individually in a private testing room. Participants removed their shoes, emptied their pockets of heavy items, and removed their coats prior to being weighed and measured on a Seca 763 High Capacity Digital Column Scale, equipped with the Seca 220 height rod. Participants also filled out the Edinburgh Handedness Inventory [9]. The EHI consists of 10 activities that individuals report performing with their right or left hand 'always', 'usually', or having no hand preference. Graduated scoring results in an EHI range from -100 (perfectly consistent-left-handedness) to +100 (perfectly consistent-right-handedness), incorporating both direction and strength of handedness.

Analyses

Height and weight

Height was recorded in centimeters (cm), and weight in kilograms (Kg). Body Mass Index (BMI) was automatically calculated by Seca machinery based on measured height and weight.

Handedness measures

Handedness direction was examined by dichotomizing the EHI based on a score at or below zero (left-handed; n=19, 15 women) versus a score above zero (right-handed; n=208, 171 women). Handedness degree was examined by i) trichotomizing the EHI into consistent-left- (CLH), consistent-right- (CRH), and inconsistent-handed (ICH) Handedness Groups by finding the median of the absolute value of the EHI (|EHI|) score of the sample (|85|; [11]. Those scoring at or below -85 (n=5, 4 women) were CLH, those scoring +85 and above were CRH (n=116, 100 women) and those scoring between -85 and +85 (n=106, 82 women) were ICH; and by ii) collapsing both CRH and CLH into a single group (n=121, 104 women), thereby creating a 'consistently-handed' group, regardless of handedness direction. Analyses were conducted on the entire sample, as well as on women only (examination of men only was not feasible for some analyses given the sample size).

Results

Handedness direction

Three t-tests were conducted on the dependent measures of height, weight, and BMI, comparing left-versus right-handers. Left-handers were marginally (non-significantly) shorter than right-handers (Left-handers: M=161.10, SD=8.4; Right-handers: M=165.05, SD=8.87; t(225)=-1.86, p=0.06). Weight did not differ between left- and right-handers. BMI differed between groups, with left-handers (M=27.34, SD=7.09) having a higher BMI than right-handers (M=23.86, SD=4.50). See Table 1.

	Total	Left-Handers	Handers	CLH CLH	ICH	CRH
N	227	19	208	5	106	116
Measured height (cm)	164.72 (8.88)	161.10^ (8.40)	165.05^ (8.87)	162.5 (9.80)	164.86 (9.67)	164.68 (8.13)
Measured weight (kg)	65.47 (14.79	69.18 (20.36)	65.13 (14.20)	64.87 (20.91)	65.98 (16.13)	65.03 (13.30)
Measured BMI	24.15 (4.85)	27.34*(7.09)	23.34*(4.50)	24.38 (6.30)	24.29 (5.15)	24.02 (4.53)
* indicates p<0.01 A indicates p=0.06						

Table 1: Means and standard deviations of the dependent measures as a function of handedness.

Means and Standard Deviations of the Dependent Measures as a Function of Handedness Direction and Handedness Degree

Elimination of men from analyses (women only, N=186) did not change the results, with the exception that height became significantly different between left- and right-handers in the manner described above (t(184)=2.50, p=0.01).

Comparisons between left- (n=4) and right-handed (n=37) men was not possible due to the small ns.

Handedness degree

Unpaired t-tests were performed comparing CRH versus ICH versus CLH on each dependent measure. There were no between group differences on any variable (p>0.50 for all comparisons), for any analysis. Collapsing across handedness direction, such that CLH and CRH were combined into a consistently-handed group, did not alter the lack of significance for any analysis.

Discussion

The between group differences in handedness effects occurred when handedness was dichotomized based on direction, rather than on degree. Specifically, overall and among women, left-handers were shorter, and had a higher BMI, than right-handers. It is not clear why the present results do not replicate those of either Propper, Brunyé, Hrank, and McGraw [1] or Tan [2], who both reported a relationship between handedness consistency, but not direction, and self-reported

height. It may be that self-report measures do not accurately reflect handedness differences in physical characteristics.

The results do offer moderate support for those previous works examining archival records of handedness that reported differences between left- and right-handers in height, finding shorter stature in the left-handed [6-9]. Interestingly, there were no between group differences in weight, ultimately resulting in a higher BMI in left-handed individuals. That is, left-handers were shorter, but weighed the same, as right-handers. These results contrast with those of previous works, wherein left-handers are both shorter and weigh less, than right-handers [7-9]. It may be that gender differences are involved in this finding; all previous works reported handedness effects in men only, whereas the present work examines a predominantly female population. Future work could directly test this possibility by recruiting sufficient left-handed men for analyses.

In sum, the present results offer some support that the handedness groups differ in physical characteristics, with handedness direction being more important than handedness degree, in a predominantly female population using measured, and not self-reported, physical characteristics. Because the current sample was relatively small, future research could determine if the present findings reflect true gender differences in the relationship between height, weight, and handedness, or limitations of sample size.

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