



## Is Signature Size Associated With Organ Donor Designation on Driver's Licenses?

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### ABSTRACT

**Introduction.** Previous studies suggest that large signature size is associated with narcissistic characteristics. By contrast, organ donation is an indicator of altruism. Because altruism and narcissism may be viewed as opposites, we sought to determine if smaller signature size is associated with willingness to be an organ donor.

**Methods.** Using a cross-sectional study design, we reviewed the health records of 571 randomly selected primary care patients at a large urban safety-net medical system to obtain their demographic and medical characteristics. We also examined driver's licenses that were scanned into electronic health records as part of the patient registration process. We measured signature sizes and obtained the organ donor designation from these driver's licenses.

**Results.** Overall, 256 (45%) patients were designated as donors on their driver's licenses. Signature size averaged 113.3 mm<sup>2</sup> but varied greatly across patients (10th percentile 49.1 mm<sup>2</sup>, 90th percentile 226.1 mm<sup>2</sup>). On multivariate analysis, donor designation was positively associated with age 18–34 years, non-black race, having private insurance, and not having any comorbid conditions. However, signature size was not associated with organ donor designation.

**Conclusions.** Signature size is not associated with verified organ donor designation. Further work is needed to understand the relationship between personality types and willingness to be an organ donor.

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**P**REVIOUS research suggests that larger signature sizes are associated with narcissistic personality characteristics. Specifically, larger signature sizes are associated with ego, dominance, status, and self-esteem [1–3]. A study of 53 graduate students found a strong correlation ( $r = 0.45$ ;  $P < .001$ ) between signature size and a validated narcissistic personality questionnaire [4]. Two recent studies of more than 500 publicly traded companies found that larger signature size among chief executive officers is associated with lower company sales and larger signature size among chief financial officers is associated with lower quality of financial reporting [4,5]. Therefore, signature size may be a convenient marker of narcissism. By contrast, organ

donation is an indicator of altruism as donors and their families are forbidden from being compensated for donation [6,7]. Because altruism and narcissism may be viewed as

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opposites, we sought to determine if smaller signature size is associated with willingness to be an organ donor.

## METHODS

This study was conducted at an urban safety-net medical system in northeast Ohio that includes a large tertiary care hospital and more than a dozen community centers located in both poor and wealthy communities. We randomly selected 671 active patients from the electronic health record on March 5, 2014. Active patients were defined as those who saw their primary care physician at least twice in the preceding 2 years. Only patients older than the age of 18 years were eligible for this study.

From electronic health records, we obtained patient demographic characteristics including age, gender, race, ethnicity, language, marital status, employment status, health insurance, and zip code. We also determined the presence of specific common comorbid conditions based on relevant ICD-9 codes, including hypertension, chronic obstructive pulmonary disease, diabetes, cancer, cerebrovascular accident, chronic kidney disease, congestive heart failure, connective tissue disease, peripheral vascular disease, myocardial infarction, peptic ulcer disease, acquired immunodeficiency syndrome (AIDS), and liver disease. Because we did not have data on individual income, we used census data to obtain the median household income of each patient's zip code.

Two researchers independently examined scanned driver's licenses, state identification cards, or learner's permits to determine each patient's organ donor designation and signature size. A third researcher resolved any discrepancies between the two researchers. We used a digital screen ruler (SnapRuler for Mac) to measure the height and width of each license, card, or permit as well as the height and width of each signature. We also recorded the number of letters or spaces in each signature. To address any magnification or reduction in licenses due to scanning, we determined the ratio of scanned signature height  $\times$  width to scanned license height  $\times$  width and then multiplied this ratio by the standard license size (4644 mm<sup>2</sup>). To account for differences in the lengths of names, we divided this amount by the number of letters or spaces in each signature and then multiplied by 14.3 (the average number of letters or spaces among all names in our sample). This study was approved by the Institutional Review Board of MetroHealth Medical Center, Cleveland, Ohio (approval number 685, protocol number 13-00548).

We used descriptive statistics (percentages, means, and standard deviations) to describe the characteristics of the patients. We used the chi-square test to determine the univariate relationship between organ donation status and several predictor variables, including demographic characteristics, medical characteristics, and signature size. We used logistic regression to determine the multivariate relationship between organ donation status and all predictor variables. *P* values  $<.05$  or 95% confidence intervals that excluded 1.00 were considered statistically significant. All statistical analyses were performed using JMP Pro 11.0 (SAS Institute, Cary, NC, United States).

## RESULTS

Of the 671 randomly selected patients, 571 (85%) had their organ donation status and signature documented on a state driver's license (387 patients), a state identification card (182 patients), or a learner's permit (2 patients). Eighty-five

patients had no license, identification card, or permit scanned into their electronic health records. Fifteen patients had distorted scans that made it impossible to assess donation status or signature size.

The demographic and medical characteristics of patients with a donation status and signature are listed in [Table 1](#). The majority of patients were female, non-Hispanic, spoke English, were unmarried, and were unemployed. The three most common comorbid conditions documented in the electronic health records were hypertension, chronic obstructive pulmonary disease, and diabetes. Signature size averaged 113.3 mm<sup>2</sup> but varied greatly across patients (10th percentile 49.1 mm<sup>2</sup>, 90th percentile 226.1 mm<sup>2</sup>; [Fig 1](#)).

**Table 1. Demographic and Medical Characteristics of Patients (n = 571)\***

Age, y	50.8 (14.2)
Gender	
Female	358 (63%)
Male	213 (37%)
Race	
White	214 (37%)
Black	275 (48%)
Other	82 (14%)
Ethnicity	
Hispanic	28 (5%)
Non-Hispanic	543 (95%)
Language	
English	538 (94%)
Spanish	18 (3%)
Other	15 (3%)
Marital status	
Married	133 (23%)
Not married	438 (77%)
Employment status	
Employed	195 (34%)
Not employed	376 (66%)
Insurance	
Private	268 (47%)
Government	266 (47%)
None	37 (6%)
Annual household income, \$1000	36.4 (16.1)
Specific medical conditions	
Hypertension	231 (40%)
Chronic obstructive pulmonary disease	110 (19%)
Diabetes	83 (15%)
Cancer	34 (6%)
Cerebrovascular accident	23 (4%)
Chronic kidney disease	26 (5%)
Congestive heart failure	27 (5%)
Connective tissue disease	12 (2%)
Peripheral vascular disease	17 (3%)
Myocardial infarction	5 (1%)
Peptic ulcer disease	10 (2%)
AIDS	5 (1%)
Liver disease	1 (0.1%)
Total medical conditions	1.1 (1.4)
Signature size, mm <sup>2</sup>	111.9 (77.3)

\*Numbers indicate mean (standard deviation) for continuous variables and (percentage) for categorical variables.

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