

Effects of inter-arm differences of brachial systolic blood pressure on the derivation of aortic systolic pressure

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Introduction

- Inter-arm differences in brachial systolic blood pressure (SBP) should not theoretically translate to differences in calculated aortic SBP, there being only one value of aortic blood pressure at any time.
- No reported study has yet compared aortic blood pressure derived from both the left and right arm simultaneously.

Methods

- This study assessed seated brachial and derived aortic SBP in 79 subjects (36 ± 16 years, 40 male) using oscillometric brachial blood pressure measurement and cuff volumetric displacement waveform recording.
- Measurements were taken simultaneously in the left and right arm using two identical SphygmoCor XCEL units (AtCor Medical, Sydney).
- Measurements were taken four times in each subject, swapping blood pressure devices between arms each measurement.

Results

- Brachial SBP was significantly higher in one arm compared to the other in 11 subjects (average difference across those 11 subjects: 5.4 ± 0.7 mmHg).
- Aortic SBP was higher when calculated from one arm than when calculated from the other in 18 subjects (average difference across those 18 subjects: 3.1 ± 0.6 mmHg).

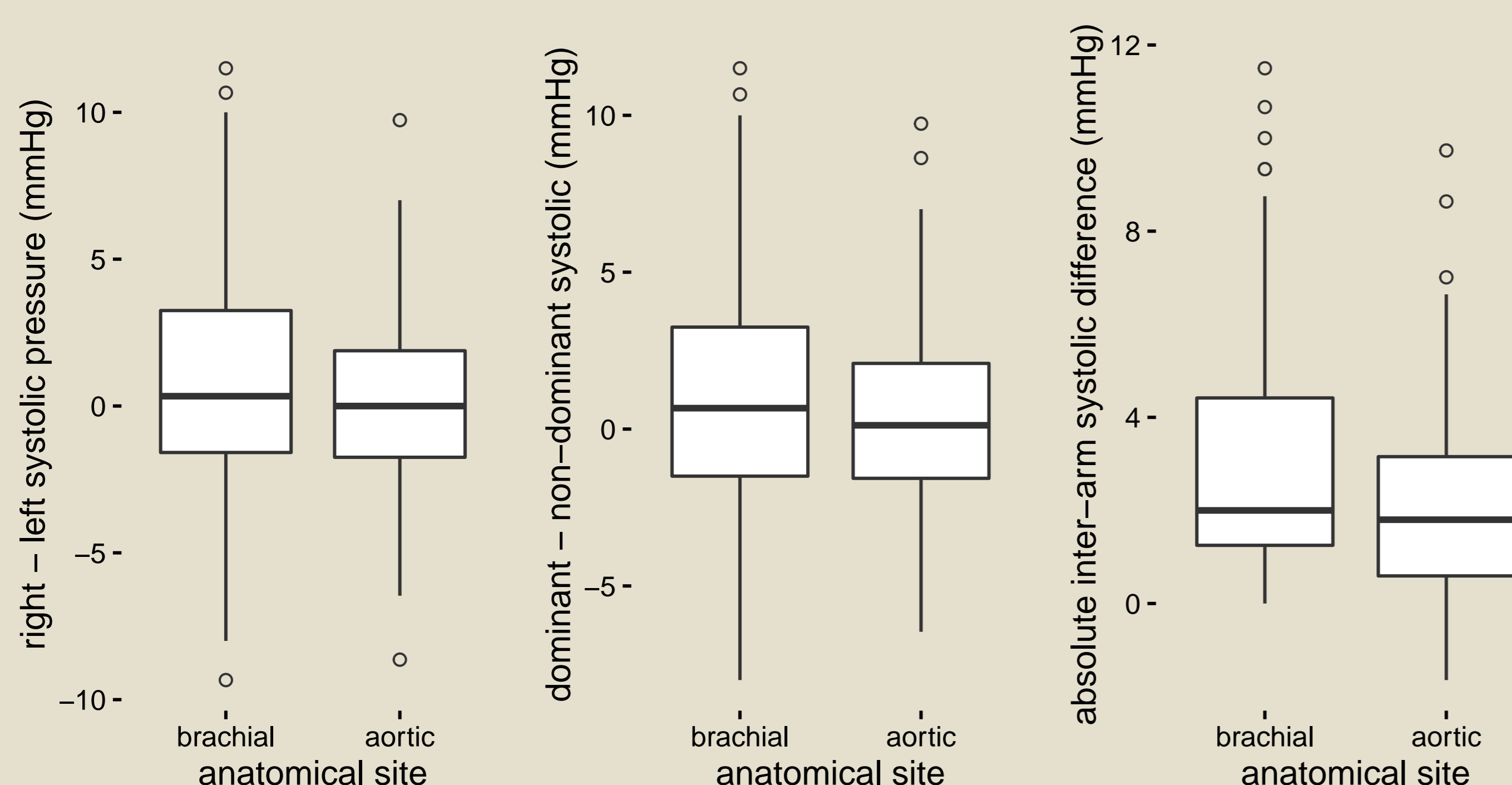


Figure 1: Right – left, dominant – non-dominant, and absolute inter-arm difference for measured brachial systolic pressure and calculated aortic systolic pressure. (Open circles indicate outlier values.)

Across all subjects, the absolute inter-arm difference in brachial SBP, irrespective of direction (i.e. highest - lowest arm pressure), was 3.2 ± 0.3 mmHg ($p < 0.001$).

Across all subjects, the absolute inter-arm difference in aortic SBP, irrespective of direction (i.e. highest - lowest arm pressure) was 2.1 ± 0.3 mmHg ($p < 0.001$).

Results (cont.)

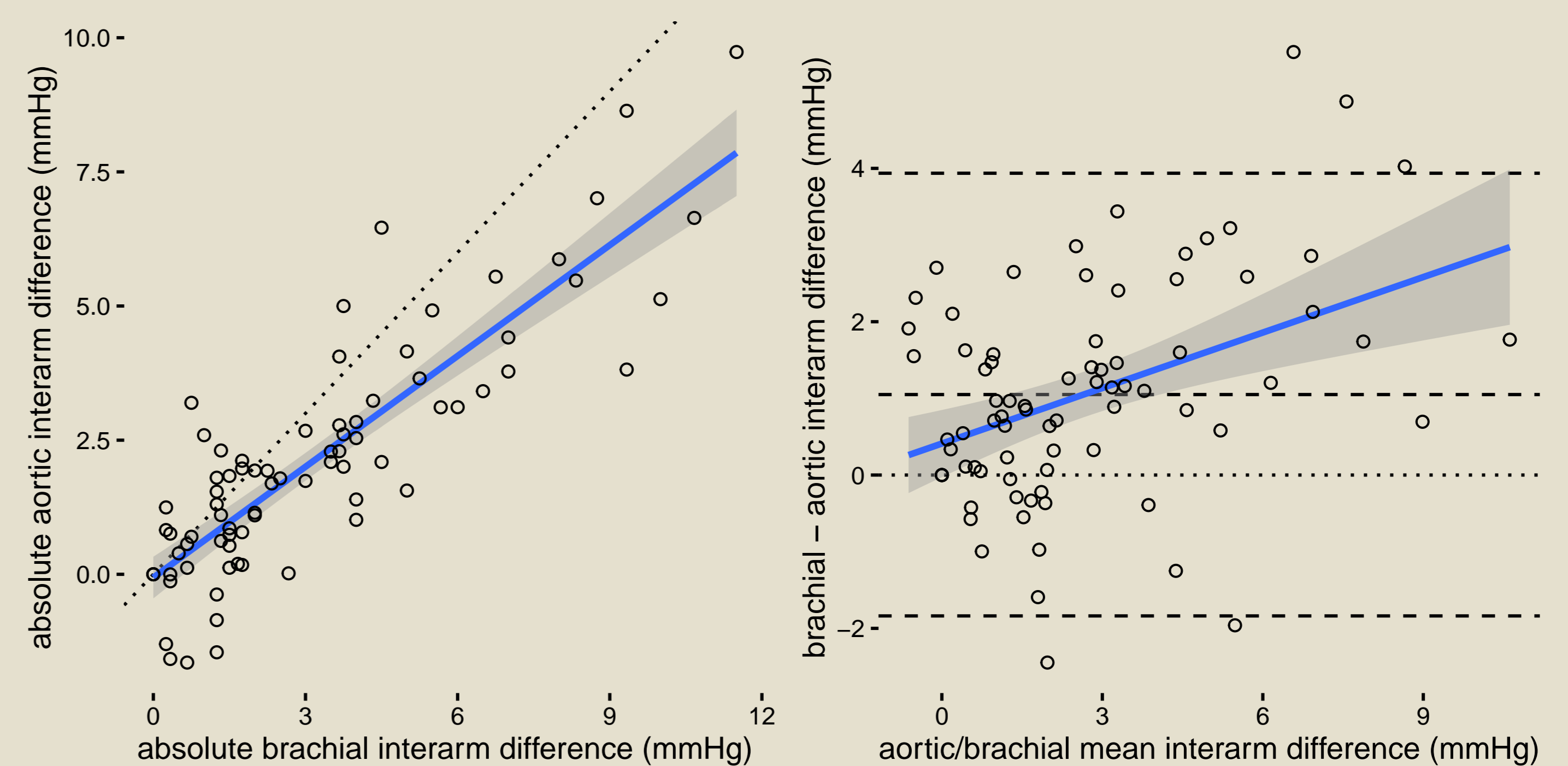


Figure 2: The inter-arm SBP difference for brachial and aortic sites was correlated ($R^2=0.74$, $p < 0.001$). Dotted line shows unity. Dashed lines show mean and mean $\pm 2 \times$ the standard deviation of the difference between inter-arm difference of brachial and calculated aortic systolic pressure.

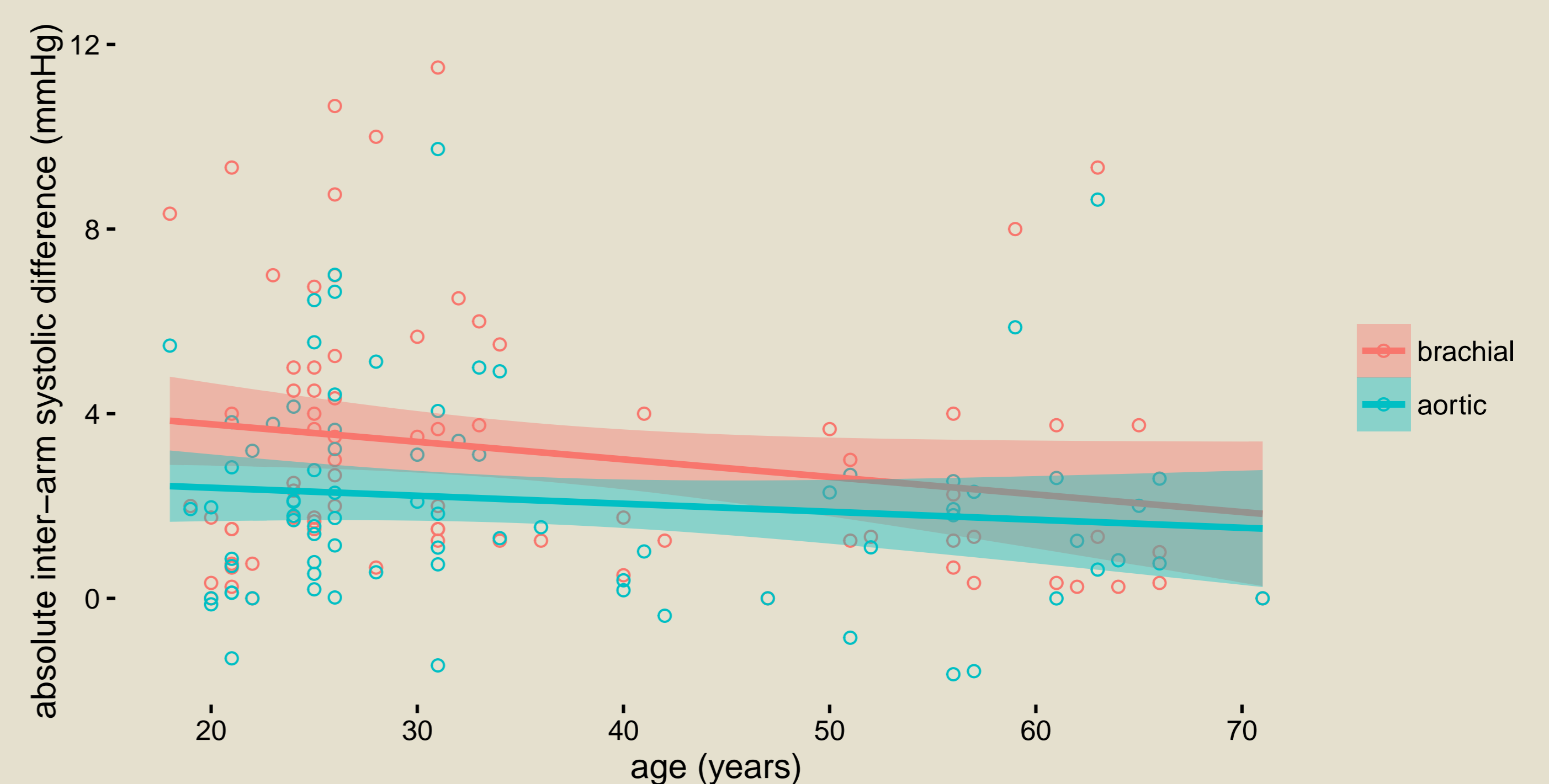


Figure 3: Absolute inter-arm difference in brachial and calculated aortic systolic pressure was not dependent on age.

Brachial inter-arm pressure difference:
slope = -0.03 mmHg/year, $R^2=0.04$, $p=0.066$.

Aortic inter-arm pressure difference:
slope = -0.02 mmHg/year, $R^2=0.01$, $p=0.30$.

- Arm dominance accounted for 1.1 ± 0.5 mmHg of the inter-arm brachial SBP difference ($p=0.032$) but did not account for any of the inter-arm aortic SBP difference ($p=0.163$).
- Average left arm SBP was not different to average right arm SBP for the whole cohort for brachial ($p=0.083$) or aortic ($p=0.789$) measurement.

Conclusions

- The inter-arm absolute difference in brachial SBP translates to a significant but small (2 mmHg) difference in derived aortic SBP.
- Further studies are required to establish if this artefactual difference in derived aortic SBP is predominantly due to arm dominance or other factors associated with left/right difference in vascular properties.