SHORT REPORT

Birth weight, adult blood pressure, and blood pressure reactions to acute psychological stress

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The fetal origins of disease hypothesis contends that an unfavourable intrauterine environment, as evidenced by low birth weight, increases vulnerability to chronic illness in adulthood.¹ There is now reasonably consistent evidence of a negative association between birth weight and adult blood pressure.² However, the mechanisms underlying this relation remain unclear. It has been suggested that individual differences in susceptibility to stress may play a part.³ One way of assessing this susceptibility is by measuring blood pressure reactions to an acute psychological stress task. There is evidence that large magnitude blood pressure reactions to such exposures predict increased resting blood pressure at subsequent follow up.⁴ Our analyses revisited the issue of birth weight and adult blood pressure and examined whether any association was mediated by individual differences in blood pressure reactions to acute stress.

PARTICIPANTS, METHODS, AND RESULTS

Data were collected as part of the West of Scotland twenty-07 study.⁵ Participants were 560 adults (260 men, 300 women), not taking antihypertensive drugs, aged 23 to 25 years old (mean age = 23.7, SD = 0.6 years), with a mean measured weight of 70.5 (SD = 13.5) kilograms. Birth weight information, collected eight years earlier from the participants' mothers, was available for 533 of the participants; average birth weight was 3359 (SD = 585) grams.

Testing sessions were conducted by trained nurses in a quiet room in the participants' homes. Systolic (SBP) and diastolic (DBP) blood pressure were determined by a validated semi-automatic sphygmomanometer at rest and twice during a three minute stress task, the paced auditory serial addition test, described elsewhere.⁴ There is evidence that individual differences in reaction to tasks of this sort are stable over time and are associated with reactivity in "real life".⁶ The task readings were averaged, and the resting baseline value subtracted to yield reactivity measures for SBP and DBP.

Mean (SD) SBP and DBP at rest was 120 (15.0) and 73 (10.0), and mean (SD) reactivity was 10 (11.1) and 7 (9.0) mm Hg, showing that the task perturbed blood pressure ($p < 0.001$ in both cases). Given that men were heavier than women at birth ($p = 0.01$) and that the inverse association between birth weight and adult blood pressure in many studies is

strengthened, or only becomes apparent, with adjustment for adult weight, hierarchical regression analysis adjusted for both sex and adult weight. In these analyses there was a significant association between birth weight and adult SBP, but not DBP (see table 1). In similar analyses, there was no association between birth weight and SBP and DBP reactivity, ($\beta = 0.04$, $p = 0.40$ and $\beta = 0.02$, $p = 0.72$). In addition, the association between birth weight and adult SBP remained significant after adjustment for reactivity ($p = 0.04$).

What this paper adds

It would seem that differences in growth trajectory predict variations in adult blood pressure, but it is unlikely that individual differences in stress reactivity mediate this relation.

COMMENT

These analyses confirm the negative association between birth weight and adult blood pressure. However, the association was significant only for SBP, was manifest only after adjustment for adult weight, and withstood additional adjustment for SBP reactivity. Thus, it would seem that it is differences in growth trajectory that predict variations in blood pressure. Individual differences in stress reactivity in this study would not seem to play a mediating part, although the possibility of such mediation cannot be completely discounted on the basis of these data. In addition, the negative association between birth weight and adult SBP was much weaker than the positive association between contemporary weight and SBP.²

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Table 1 Birth weight and adult SBP and DBP: final models

	B	95% CI	β	p	ΔR^2
Resting SBP					
Step 1: Sex	-11.76	-14.02 to -9.24	-0.39	<0.001	
Adult weight	0.32	0.23 to 0.41	0.29	<0.001	0.334
Step 2: Birth weight	-0.003	-0.004 to 0.00	-0.08	0.02	0.006
Resting DBP					
Step 1: Sex	-2.46	-4.20 to -0.58	-0.12	0.008	
Adult weight	0.24	0.17 to 0.31	0.32	<0.001	0.149
Step 2: Birth weight	-0.001	-0.002 to 0.00	-0.06	0.12	0.004

Conflicts of interest: none declared.

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