Higher blood pressure in youth is attributable to a combination of higher cardiac output and higher total peripheral resistance

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Background It has been proposed that high blood pressure (BP) in young people is due to high cardiac output (CO) with normal total peripheral resistance (TPR) - a hyperkinetic/hyperdynamic circulation. We investigated this in a large, population-based cohort of adolescents.

Methods The study was conducted on 2091 participants in the Avon Longitudinal Study of Parents and Children (ALSPAC), a prospective population-based birth cohort study, aged 17. BP measurement and echocardiography was performed and heart rate (HR), stroke volume (SV) and TPR calculated. Data are means(SD).

Results Table 1 shows selected characteristics of the sample. Higher quintiles of systolic BP were associated with higher SV, higher HR and higher TPR. However, the proportional contribution made by SV, HR and TPR to mean arterial pressure differed little by systolic BP quintile (stroke volume (32-34%) heart rate (25-29%) and TPR (39-41%)).

Variable	Males (n=939)	Females (n=1152)	All (n=2091)
Age, y	17.7(0.3)	17.7(0.3)	17.7(0.3)
BMI, kg/m^2	22.5(3.7)	23.1(4.2)	23.0(4.0)
BP, mmHg	122(11)/64(8)	112(9)/65(7)	117(11)/65(8)
HR, bpm	67(10)	71(10)	69(10)
CO, L/min	4.0(1.0)	3.6(0.8)	3.8(0.9)
SV, ml	60(13)	51(11)	55(13)
TPR, mmHg.ml/min	22.3(5.9)	23.7(6.0)	23.0(6.0)

Conclusions Higher blood pressure is attributable to a combination of higher cardiac output (i.e. SV x HR) and higher TPR in a population-based sample of adolescents. There is no evidence of a disproportionate contribution from CO at higher BP levels.