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Cardiovascular risk factors before and during pregnancy: Does pregnancy unmask or initiate risk?

Emily W. Harville, PhD;[a*] Carrie E. Crook,[b] Lydia A. Bazzano, MD, PhD,[a] Jessica G. Woo, PhD,[c] Trudy L. Burns, PhD,[d] Olli Raitakari, MD, PhD,[e] Elaine M. Urbina, MD,[f] Alison Venn, PhD,[g] David R. Jacobs, Jr., PhD,[h] Julia Steinberger, MD, MS,[i] Alan Sinaiko, MD,[h] Terence Dwyer, MD,[j] Markus Juonala, MD, PhD[k] and the i3C Consortium

[a] *Department of Epidemiology, Tulane University School of Public Health and Tropical Medicine, New Orleans, LA, USA*

[b] *Tulane University School of Medicine, New Orleans, LA, USA*

[c] *Division of Biostatistics and Epidemiology, Cincinnati Children's Hospital Medical Center; Department of Pediatrics, University of Cincinnati College of Medicine, Cincinnati, OH, USA*

[d] *Department of Epidemiology, College of Public Health, University of Iowa, Iowa City, IA, USA*

[e] *Research Centre of Applied and Preventive Cardiovascular Medicine, University of Turku, Turku, Finland*

[f] *The Heart Institute, Cincinnati Children's Hospital Medical Center, Department of Pediatrics, University of Cincinnati College of Medicine, Cincinnati, OH, USA*

[g] *Menzies Institute for Medical Research, University of Tasmania, Hobart, Tasmania, Australia*

[h] *Division of Epidemiology and Community Health, University of Minnesota, School of Public Health*

[i] *Department of Pediatrics, University of Minnesota Medical School, Minneapolis, MN, USA*

[j] *George Institute for Global Health, University of Oxford, United Kingdom*

[k] *Department of Medicine, University of Turku and Division of Medicine, Turku University Hospital, Turku, Finland*

Running Title: CV risk before and during pregnancy

Corresponding Author: EW Harville

Department of Epidemiology, Tulane University School of Public Health and Tropical Medicine, Epidemiology #8318, 1440 Canal St. Ste. 2001, New Orleans, LA, 70112, USA. eharvill@tulane.edu.

Cardiovascular risk factors before and during pregnancy: Does pregnancy unmask or initiate risk?

Objectives: To understand if pregnancy unmasks previously silent cardiovascular (CV) adverse factors, or initiates lasting injury.

Methods: Pre-pregnancy and during pregnancy CV risk factors (blood pressure, fasting lipids and glucose) from 296 women belonging to studies in the International Childhood Cardiovascular Cohort (i3C) Consortium, a group of studies assessing the relationship between child and adolescent CV risk factors and adult outcomes, were used. Correlation coefficients between the pre- and during pregnancy measures were calculated, and the mean difference between the measures was modeled with adjustment for age, Body Mass Index (BMI), race, smoking, and study.

Results: Measures were strongly correlated at pre- and during-pregnancy visits ($p<0.01$), with r of between 0.3 and 0.8. In most cases, the difference between pre-pregnancy and during-pregnancy did not differ significantly from 0 after adjustment for confounders. Stratification by gestational age indicated stronger correlations with measurements obtained during the first and second trimesters than the third. The correlation did not differ by the time elapsed between the pre-pregnancy and pregnancy visits.

Conclusions: Pre- and during-pregnancy CV risk factors are moderately well correlated. This may indicate that susceptible women enter pregnancy with higher risk rather than pregnancy inducing new vascular or metabolic effects.

Introduction

Recently there have been calls for more attention to preconception and interconceptional health, both to improve pregnancy health and to encourage prevention of disease that may develop after pregnancy [1-5]. Women with chronic hypertension who become pregnant are at higher risk of preterm birth and small-for-gestational-age fetuses [6, 7], and some studies indicate that preconception cardiovascular health outside clinical disease also has an impact on pregnancy health [8-10]. However, studies have not generally investigated whether preconception health can indicate health outcomes beyond that of measures taken during pregnancy. These questions are difficult to investigate, as few studies have information on both preconception and during-pregnancy cardiovascular risk. Pregnancy studies usually have information only on diagnosed preconception conditions, if at all. Almost half of pregnancies are unplanned [11], so studies in women attempting to conceive are unrepresentative. Studies of cardiovascular health tend to focus on older populations and often exclude pregnant women if they address younger populations. Complications such as gestational diabetes, pre-eclampsia, low birthweight, and preterm birth predict cardiovascular morbidity and mortality [12-14]. Although the relationship between pregnancy complications and later cardiovascular health is well-established, it still is not clear whether future CVD is induced by pregnancy in women with pre-pregnancy adverse levels of CV risk factors or effects [15].

We examine female participants in the International Childhood Cardiovascular Cohort (i3C) consortium on childhood health. This is a group of 7 cohorts that studied childhood cardiovascular risk factors and who are currently being followed for cardiovascular outcomes as adults. None of these cohorts were designed specifically to address pregnancy, but four of them include information on some women both prior to and during pregnancy. In this analysis, we

examine the correlation and strength of association between cardiovascular risk factor measures taken prior to pregnancy and during pregnancy in an attempt to define changes that may influence the occurrence of cardiovascular disease subsequent to pregnancy. There is some longitudinal research tracing a single cardiovascular risk factor prior to pregnancy, during pregnancy, and post pregnancy [16,17]. This study aims to illuminate if pregnancy, itself, alters cardiovascular risk in women. While this study does not directly answer of whether pregnancy induces future CVD in this cohort, this information provides a useful context for discussing progression of CVD in parous women, as it tracks how cardiovascular risk factors are influenced by pregnancy.

Materials and Methods

In 2009, seven longitudinal cohort studies from the United States., Finland and Australia formed the International Childhood Cardiovascular Cohort (i3C) Consortium. Details of the consortium methods and members have been previously published [16, 17]. Four of the studies (The Bogalusa Heart Study (BHS), The Cardiovascular Risk in Young Finns Study (YF), The Childhood Determinants of Adult Health Study (CDAH), and The National Heart, Lung, and Blood Institute Growth and Health Study (NGHS) collected data from women during pregnancy (in the other studies, pregnant women were asked to return after the pregnancy was completed). From the four cohorts, 359 women had at least one pre-pregnancy and one during-pregnancy visit, with 296 having information on the same risk factor at both visits. Of these 296 women, 210 women also had information after pregnancy on the same risk factor and 141 of these pregnant women were matched to nulliparous women in these cohorts. As pre-pregnancy BMI and weight gain have been widely studied, they are included as background but are not the focus

of this analysis. Though this study is limited by the number of pre-pregnancy and during

pregnancy cardiovascular measures in the same woman, the sample cohort contains data from

women spanning three continents and multiple populations, adding to the generalizability of the

study.

Data structure

Because the studies followed different study designs, there is no consistent age at which visits

were performed, either in absolute terms or relative to the pregnancy. For the purposes of

analysis in the present study, if a woman had multiple pre-pregnancy visits, the visit closest in

time to the pregnancy was used; if she was pregnant during multiple visits, the first pregnancy

was used.

Pregnancy-related data

The four cohorts recorded whether women attending study visits were currently pregnant, but

none performed pregnancy tests. Gestational age, in weeks (CDAH) or months (BHS, for some

follow-ups) were obtained from some of the pregnant women.

Cardiovascular measures

The following CVD-related factors were available for study: systolic blood pressure (n=263),

diastolic blood pressure (phase 5 (n=259) and phase 4 (n=213)), total cholesterol (n=283), HDL-

C (n=283), LDL-C (n=282), triglycerides (n=233), glucose (n=162), and insulin (n=165).

Details of measurement protocols and data harmonization have been previously published [16,

17].

Analysis

The correlations between pre-pregnancy and pregnancy measures were examined using Pearson's r, except for strongly skewed measures (triglycerides, insulin), which were examined using Spearman correlations. Results were stratified by trimester of measurement, if available, and by time between pre-pregnancy visit and pregnancy. Measures during pregnancy were modeled as a function of pre-pregnancy values, both unadjusted and with control for age at pregnancy and at study visit, study, race/ethnicity, smoking status at pre-pregnancy visit, and BMI. The absolute difference between the measure during pregnancy and the measure before pregnancy was also calculated, and mean difference was estimated using linear regression adjustment for age, study, race, smoking status, and BMI.

Two comparison groups were also examined. First, a subset of women with data both during and after the pregnancy (n=210) were examined for associations between both the pre-pregnancy visit and the visits during and after pregnancy. Second, a cohort of non-pregnant women (N=141) was matched to 141 of the women with visits during pregnancy. Each woman was matched based on study, year of visits (within one year), and age of visit (within one year); if multiple women met those criteria, a match was randomly selected. Thus, the groups are similar in terms of timing of visits and age, but vary by pregnancy status at the second visit. Analyses examined whether the associations were stronger or weaker in the group measured during pregnancy.

This secondary analysis of de-identified data was ruled exempt by the Tulane Institutional Review Board. All women provided written informed consent as part of the original studies.

Results

296 women had information on at least one pre-pregnancy and one during-pregnancy visit (Table 1), with the majority from the BHS (N=174) and YF Study (96). Of these women, 168 women had information identifying that corresponded to a specific trimester (Table 1). The mean age at the pre-pregnancy visit was 18 (range 3-40), and the mean age at pregnancy was 27 (range 14-45). The mean number of years between the pre-pregnancy and pregnancy visits was 8.5 ± 5.8.

Measures taken before and during pregnancy were correlated (Table 2). The column "r" represents the correlation coefficient between the pre-pregnancy and during-pregnancy values for the given metric. Most strongly correlated was BMI, at r=0.76. Most of the cardiovascular measures were correlated at the r=0.35 to r=0.55 level, with the exception of glucose, which was essentially uncorrelated. Although the small numbers make interpretation difficult, first trimester measures were generally more strongly correlated with pre-pregnancy measures than the second and third trimesters, but measures taken within three years prior to the pregnancy were not more strongly correlated than measures taken greater than three years prior to the pregnancy measures (Table 2). Within the group with both during-pregnancy and post-pregnancy measures, the risk factor correlations with pre-pregnancy values were similar for the two visits (Table S1). When the during-pregnancy measure was modeled as a function of pre-pregnancy measures (Table 3), the two measures were positively associated (although the

strength of the association varied), except for glucose, and, after adjustment for covariates,

insulin (Supplementary figures 1-9). BMI and lipids were significantly higher during

pregnancy, while blood pressure was significantly lower (Table 4). After adjustment for

covariates, the average difference for most measures was not statistically different from zero,

with the exception of LDL and glucose.

The matched group with a non-pregnant second visit showed similar correlations between

measures taken at the earlier and later visits (table S1), with the exception of LDL (0.70 vs. 0.37,

both $p<0.01$), and, possibly, glucose (0.01 vs. 0.22, $p>0.05$ for both) being more strongly

correlated in the non-pregnant group. When risk factors were modeled as a function of the

values at the first (pre-pregnant) visit, risk factors in the matched, non-pregnant group were

generally more strongly predictive for BMI, LDL, and glucose, but less predictive for

triglycerides (Table S2). Comparison of the matched groups also confirmed the associations of

pregnancy with lower blood pressure and higher lipids (Table S3), patterns that were not seen in

the non-pregnant group.

Discussion

By studying the relation between measures of cardiovascular risk prior to and during pregnancy,

we help assess the degree to which cardiovascular risk factors during pregnancy reflects overall

cardiovascular risk, or whether pregnancy is a time of life that is separate from general health. In

this study, we found that, for most risk factors, pre-pregnancy and during-pregnancy measures

were correlated, although, given the values of the correlation coefficient (0.29-0.54), the majority

of the variance (>70%) still remained to be explained. The correlations were not dependent on

the length of time between the two measurements. These results suggest that the level of CV risk in pregnant women simply reflects the relative pre-pregnancy level, consistent with more general findings of tracking of cardiovascular risk across the life course. This was confirmed by the similar correlations found with values after the pregnancy, and in women who were followed for a similar length of time but who were not pregnant during the visits. Among these women, pregnancy was not found to transform pre-pregnancy cardiovascular risk into more malignant disease; while pregnancy does not mitigate CV risk, women with higher levels of adverse CV risk must be managed appropriately.

Few longitudinal studies have compared pre-pregnancy and pregnancy CV risk factor levels on the same women. A study of 29 Danish women found that cholesterol levels were higher during pregnancy than the year before, while HDL levels were similar [18]. A study of 101 women trying to conceive found that blood pressure up to 18 months prior to pregnancy was about 9 mmHg higher than second-trimester blood pressure, [19], and a similar study found a reduction in mean arterial pressure [20]. Many studies have examined pre-pregnancy BMI and weight gain, and early pregnancy weight has been found to represent preconception weight [21]. Overall, studies comparing pregnant and non-pregnant groups indicate pregnancy is associated with higher lipid levels [22] and lower blood pressure, especially early in pregnancy [23]. While our results are consistent with these, other studies have suggested that pre-pregnancy blood pressure and lipids are associated with hypertensive disorders of pregnancy [24-27]. A recent study following 8899 pregnant women without diagnosed pre-pregnancy hypertensive disorders found that early pregnancy blood pressures are predictive of hypertensive disorders of pregnancy in the second and third trimesters at a lower threshold than previously used [30].

The exception to this pattern of strong correlations was glucose, where pre-pregnancy and during-pregnancy measures were not strongly associated. Insulin, too, was less strongly associated when confounders were taken into account. Some studies have shown associations between pre-pregnancy glucose and insulin and development of gestational diabetes [10, 28], although generally with measures taken over a shorter time period.

Limitations of the study include the relatively small sample, the variation in timing between the pre-pregnancy measure and the pregnancy, and the lack of information on the health of the pregnancy.

Overall, this study indicates that pre-pregnancy and during-pregnancy measures of cardiovascular risk are strongly correlated and suggests that the observed associations between pregnancy-related health risks and later cardiovascular health are potentially due to longstanding underlying risk. For example, first trimester blood pressure measures correlate to hypertensive disorders of pregnancy in the second and third trimesters [30]; our data shows a strong to moderate correlation between pre-pregnancy blood pressures and first trimester blood pressures (Table 2). The weaker correlation between pre-pregnancy cardiovascular factors and second and third trimester measurements can likely be attributed to changes in maternal physiology. At 20-28 weeks gestation, the maternal cardiovascular system will reach peak changes in systemic vasodilation, cardiac output, and heart rate [29]. Clinically, the study data indicates that cardiovascular risk is longitudinal, and preconception health strongly correlates to cardiovascular risk, especially in the first trimester. Cardiovascular health needs to be managed over the life

course. Pregnancy, itself, does not initiate CVD risk in otherwise healthy women, and pregnancy complications may begin in the first trimester [30-33], even if they are not clinically apparent. However, as other studies have addressed, complications in pregnancy—like hypertensive disorders of pregnancy—increase risk of future CVD [32]. Future studies should focus on how early pregnancy CV measures predict pregnancy complications to further strengthen understanding of how preconception health relates to future CVD. The results presented here suggest that with regard to cardiovascular measures, pregnancy is not a disparate time of health, so a focus on improving the preconception health of women in their childbearing years may yield improved pregnancy and long-term outcomes. More research is needed to identify time periods when interventions are likely to be most effective, as well as the degree to which screening and intervention programs for both pregnancy-related complications and cardiovascular health should be targeted to these women.

Disclosure Statement

The authors report no conflicts of interest.

Word Count: 5153

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Table 1. Description of included sample

Study		N	%
	Bogalusa Heart Study	174	58.8
	Childhood Determinants of Adult Health	22	7.4
	NHLBI Growth and Health Study	4	1.4
	Cardiovascular Risk in Young Finns Study	96	32.4
Country			
	Australia	22	7.4
	Finland	96	32.4
	U.S.	178	60.1
Race/ethnicity			
	Black	82	25.8
	White	214	67.3
	Not specified	22	6.9
Smoking (pre-pregnancy visit)			
	never	169	64.8
	former	54	20.7
	current	38	14.6
pre-pregnancy visit in childhood (<13 years)		60	20.3
pre-pregnancy visit in adolescence (13-<18 years)		93	31.4

pre-pregnancy visit in adulthood (18+ years)	143	48.3		

	mean	median	min	max
Age at pregnancy	26.9	27.0	14.1	45.5
Age at pre-pregnancy visit	18.4	17.8	2.96	40.2
Gap between pregnancy and pre-pregnancy visits (years)	8.5	6.2	0.88	21.3
Number of study visits	6.6	6.0	2.0	17.0
Age at first visit	9.6	9.3	2.82	18.6
Age at most recent	35.4	37.0	14.1	50.3

Values at pre-pregnancy visit*

	mean	median	min	max
BMI (kg/m^2)	21.8	20.8	13.5	45.1
systolic blood pressure (mmHg)	110.0	109.3	85.3	155.7
diastolic blood pressure, phase V (mmHg)	62.5	62.7	29.7	92.7
total cholesterol (mmol/L)	4.6	4.6	2.5	8.2
LDL-C (mmol/L)	2.8	2.7	0.8	5.7
HDL-C (mmol/L)	1.4	1.4	0.1	2.8
triglycerides (mmol/L)	0.94	0.83	0.30	3.40

glucose (mmol/L)	4.6	4.6	3.6	6.7
insulin (µU/ml)	11.6	9.8	1.5	143.0

BMI, body mass index; LDL-C, low-density lipoprotein; HDL-C, high-density lipoprotein

*If study had multiple pre-pregnancy visits, data was taken from the last visit prior to pregnancy

Table 2. Correlation between pre-pregnancy and during-pregnancy measures, by trimester (in the subset with trimester noted) and by the time between last pre-pregnancy visit and pregnancy measure

	r (95% CI)	1st trimester (n=56)	2nd trimester (n=70)	3rd trimester (n=42)	<3 years (n=55)	> 3 years (n=229)
BMI (n=267)	0.76 (0.71, 0.81)	0.82 (0.71, 0.89)	0.76 (0.65, 0.84)	0.85 (0.73, 0.92)	0.93 (0.88, 0.96)	0.72 (0.65, 0.78)
systolic blood pressure (n=263)	0.54 (0.45, 0.62)	0.59 (0.39, 0.74)	0.51 (0.31, 0.66)	0.51 (0.23, 0.70)	0.52 (0.29, 0.68)	0.55 (0.44, 0.64)
diastolic blood pressure, phase V (n=259)	0.44 (0.34, 0.54)	0.44 (0.20, 0.63)	0.30 (0.08, 0.50)	0.23* (-0.08, 0.50)	0.25* (-0.02, 0.48)	0.48 (0.36, 0.58)
cholesterol (n=283)	0.43 (0.32, 0.52)	0.67 (0.47, 0.80)	0.49 (0.29, 0.65)	0.52 (0.25, 0.71)	0.55 (0.32, 0.72)	0.39 (0.28, 0.50)
LDL (n=282)	0.35 (0.25, 0.45)	0.65 (0.45, 0.78)	0.43 (0.21, 0.60)	0.40 (0.10, 0.62)	0.39 (0.12, 0.59)	0.35 (0.23, 0.46)
HDL (n=283)	0.29 (0.18, 0.39)	0.38 (0.12, 0.59)	0.42 (0.20, 0.59)	-0.05* (-0.35, 0.27)	0.00* (-0.28, 0.28)	0.40 (0.28, 0.50)
triglycerides (n=233)	0.37 (0.25, 0.48)	0.66 (0.41, 0.81)	0.58 (0.35, 0.74)	0.38 (0.00, 0.66)	0.32* (-0.03, 0.60)	0.38 (0.25, 0.49)

glucose (n=162)	0.11* (-0.04, 0.26)	0.05* (-0.30, 0.39)	0.37* (0.08, 0.60)	-0.07* (-0.48, 0.38)	0.09* (-0.27, 0.42)	0.10 (-0.07, 0.27)
insulin (n=165)	0.35 (0.21, 0.48)	0.55 (0.22, 0.76)	0.36 (0.06, 0.60)	0.22* (-0.24, 0.59)	0.33* (-0.07, 0.63)	0.35 (0.19, 0.49)

BMI, body mass index; LDL-C, low-density lipoprotein; HDL-C, high-density lipoprotein
all p<0.05 for non-zero correlation except marked*

Table 3. Cardiovascular risk factors during pregnancy as a function of pre-pregnancy value

	Unadjusted model	Adjusted model[a]
BMI (kg/m^2)	0.88 (0.05)	0.95 (0.05)[b]
systolic blood pressure (mmHg)	0.53 (0.05)	0.48 (0.06)
diastolic blood pressure, phase V (mmHg)	0.46 (0.06)	0.37 (0.06)
cholesterol (mmol/L)	0.58 (0.07)	0.55 (0.09)
LDL-C (mmol/L)	0.47 (0.07)	0.53 (0.08)
HDL-C (mmol/L)	0.33 (0.07)	0.33 (0.07)
triglycerides (mmol/L)	0.71 (0.13)	0.87 (0.15)
glucose (mmol/L)	0.13 (0.09)*	0.04 (0.10)*
insulin (µU/ml)	0.23 (0.05)	0.09 (0.31)*

BMI, body mass index; LDL, low-density lipoprotein; HDL, high-density lipoprotein

*all $p<0.01$ except for those marked, which are $p>0.15$

Beta estimates (SE) are presented

[a] adjusted for age, BMI, race, study, smoking; except BMI model [b] adjusted for age, race, study and smoking.

Table 4. Absolute difference in risk factor between pre- and during-pregnancy visits

	mean difference [a] (SD)*	median difference (IQR)	mean difference, adjusted for age, BMI, study, race, smoking[b]
BMI	4.30 (3.76)	3.69 (1.72, 6.01)	2.44 (-0.88, 5.75)
systolic blood pressure	-1.46 (10.58)	-2.00 (-8.33, 5.34)	-3.33 (-14.37, 7.71)
diastolic blood pressure, phase V	-4.45 (11.18)	-5.67 (-12.33, 1.34)	-11.4 (-22.9, 0.22)
cholesterol	0.97 (1.25)	0.96 (0.03, 1.80)	0.93 (-0.50, 2.35)
LDL	0.57 (1.10)	0.49 (-0.21, 1.19)	1.72 (0.55, 2.90)
HDL	0.15 (0.53)	0.19 (-0.14, 0.50)	-0.39 (-0.98, 0.19)
triglycerides	0.83 (0.89)	0.75 (0.24, 1.34)	0.20 (-0.85, 1.25)
glucose	-0.26 (0.68)	-0.28 (-0.67, 0.12)	-1.09 (-2.14, -0.03)
insulin	-0.16 (12.44)	0.00 (-4.50, 3.90	-5.62 (-19.95, 8.72)

BMI, body mass index; LDL, low-density lipoprotein; HDL, high-density lipoprotein
[a]measure during pregnancy - measure before pregnancy

[b] BMI model was not adjusted for BMI
*all significantly different from 0, except insulin

Table S1. Correlation between pre-pregnancy and a) measures during pregnancy, and b) measures after pregnancy

	correlation with pregnancy r (95% CI)	correlation with post-pregnancy r (95% CI)
BMI (n=187)	0.77 (0.70, 0.82)	0.76 (0.71, 0.81)
systolic blood pressure (n=200)	0.57 (0.47, 0.66)	0.54 (0.43, 0.63)
diastolic blood pressure, phase V (n=197)	0.51 (0.40, 0.61)	0.46 (0.34, 0.56)
cholesterol (n=202)	0.42 (0.30, 0.53)	0.59 (0.49, 0.67)
LDL (n=199)	0.34 (0.21, 0.46)	0.50 (0.39, 0.60)
HDL (n=200)	0.33 (0.20, 0.45)	0.43 (0.31, 0.53)
triglycerides (n=233)	0.35 (0.22, 0.47)	0.36 (0.23, 0.49)
glucose (n=125)	0.17 (-0.01, 0.33)	0.21 (0.05, 0.37)
insulin (n=165)	0.41 (0.26, 0.54)	0.46 (0.31, 0.58)

Table S1a. Correlation between pre-pregnancy and during-pregnancy measures and a matched group with two non-pregnant measures taken at the same ages

	pregnant		nonpregnant	
	n	r (95% CI)	n	r (95% CI)
BMI	127	0.76 (0.68, 0.82)	118	0.77 (0.68, 0.83)
systolic blood pressure	128	0.60 (0.47, 0.70)	110	0.62 (0.49, 0.72)
diastolic blood pressure, phase V	126	0.51 (0.36, 0.63)	109	0.48 (0.32, 0.61)

cholesterol	123	0.49 (0.34, 0.61)	112	0.64 (0.52, 0.74)
LDL	124	0.37 (0.21, 0.51)	114	0.70 (0.59, 0.78)
HDL	125	0.36 (0.20, 0.50)	115	0.45 (0.29, 0.58)
triglycerides	95	0.45 (0.27, 0.60)	99	0.42 (0.24, 0.57)
glucose	67	0.01 (-0.23, 0.25)	70	0.22 (-0.02, 0.43)
insulin	72	0.44 (0.23, 0.61)	67	0.39 (0.16, 0.57)

BMI, body mass index; LDL, low-density lipoprotein; HDL, high-density lipoprotein

Table S2. Later cardiovascular risk factors as a function of earlier values in two matched cohorts (one group with pre-pregnant and pregnant measures, and a similar group matched on age, year, and study, but not pregnant at second visit; total n=141 per group)

	pregnant		non-pregnant	
	beta (SE)	adjusted beta (SE)[a]	beta (SE)	adjusted beta (SE)[a]
BMI[b]	0.87 (0.07)	0.78 (0.08)	1.01 (0.08)	1.02 (0.08)*
systolic blood pressure	0.58 (0.07)	0.49 (0.07)	0.67 (0.08)	0.58 (0.09)
diastolic blood pressure, phase V	0.52 (0.08)	0.45 (0.08)	0.43 (0.07)	0.40 (0.08)
cholesterol	0.61 (0.10)	0.60 (0.12)	0.70 (0.08)	0.67 (0.08)
LDL	0.47 (0.10)	0.53 (0.13)	0.82 (0.08)	0.83 (0.08)*
HDL	0.37 (0.08)	0.34 (0.10)	0.38 (0.07)	0.36 (0.07)
triglycerides	1.10 (0.18)	1.05 (0.18)	0.36 (0.09)	0.44 (0.09)*
glucose	0.01 (0.12)	-0.24 (0.10)	0.19 (0.11)	0.19 (0.10)*
insulin	0.52 (0.15)	-0.05(0.70)	0.73 (0.15)	0.50 (0.17)

BMI, body mass index; LDL, low-density lipoprotein; HDL, high-density lipoprotein

*p for interaction ≤0.05

[a] adjusted for age, BMI, race, study, smoking

[b] BMI model was not adjusted for BMI

Table S3. Absolute difference in risk factor between pre- and during-pregnancy visits/matched cohort (total n=141 per group)

	mean difference[a] (SD)		median difference		
	pregnant	non-pregnant	pregnant	non-pregnant	
BMI	4.65	3.70	4.07	2.5	
systolic blood pressure	-1.40	2.07	-2.33	1.2	*
diastolic blood pressure, phase V	-3.47	6.21	-4.50	4.0	*
diastolic blood pressure, phase IV	-4.00	4.30	-4.33	2.3	*
cholesterol	0.99	0.19	0.98	0.1	*
LDL	0.65	0.24	0.59	0.3	*
HDL	0.12	-0.06	0.17	0.0	*
triglycerides	0.83	0.08	0.75	0.1	*
glucose	-0.28	-0.03	-0.33	0.0	*
insulin	0.82	-0.20	0.00	-0.5	

BMI, body mass index; LDL, low-density lipoprotein; HDL, high-density lipoprotein
[a]measure during pregnancy - measure before pregnancy
*Statistically different between pregnant and non-pregnant. Median BMI differed between groups, but mean did not.
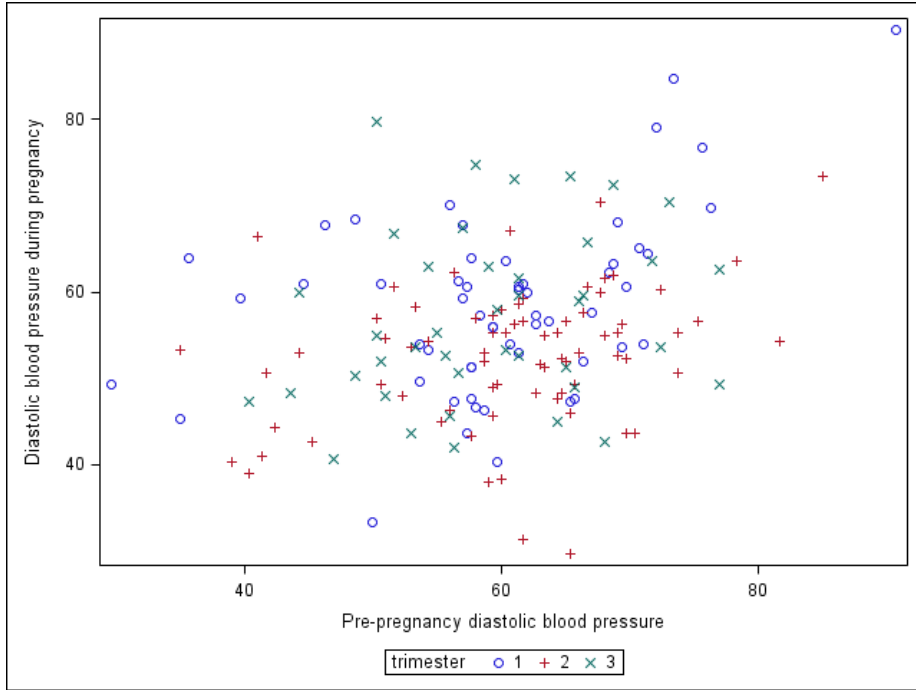
Supplementary figures
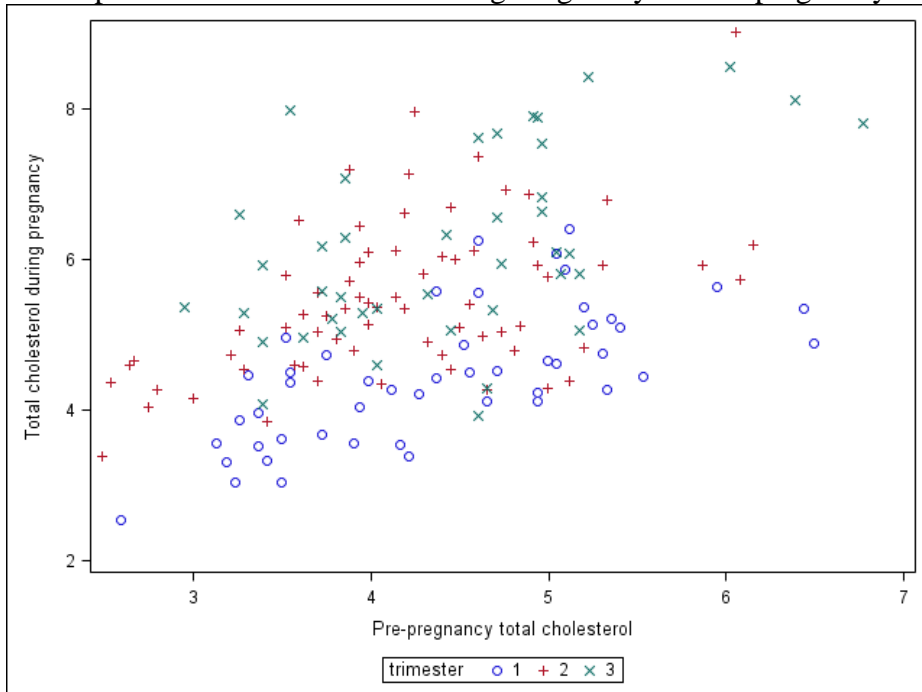Scatterplot 1. BMI during pregnancy vs. BMI during pregnancy
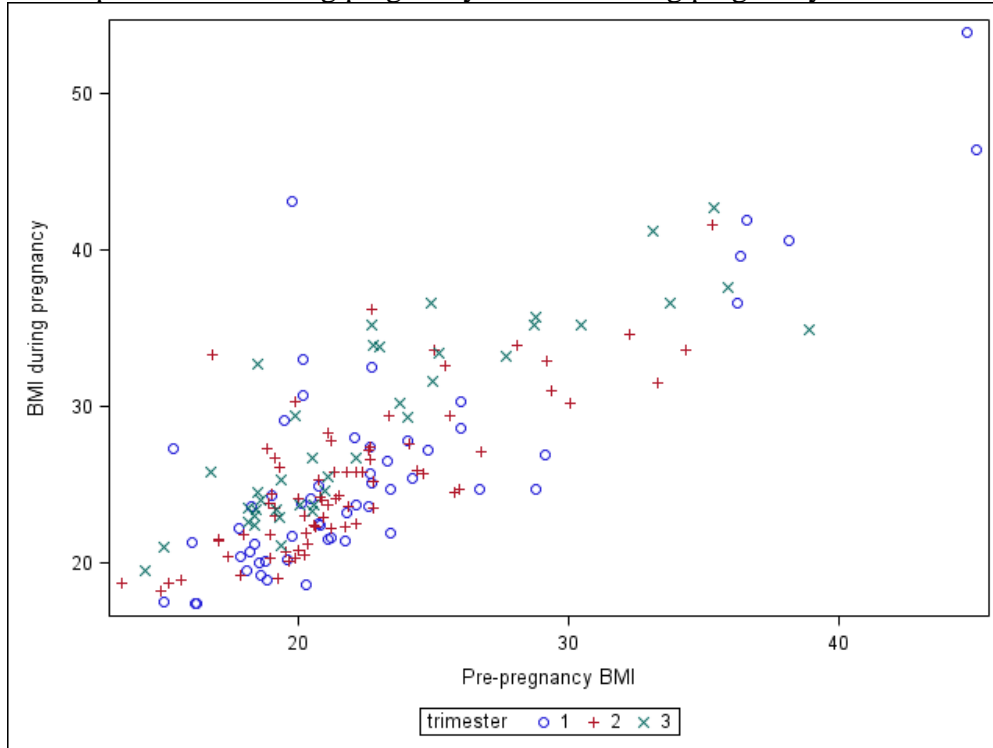
Scatterplot 2. Systolic Blood Pressure During Pregnancy vs. Pre-pregnancy systolic blood pressure
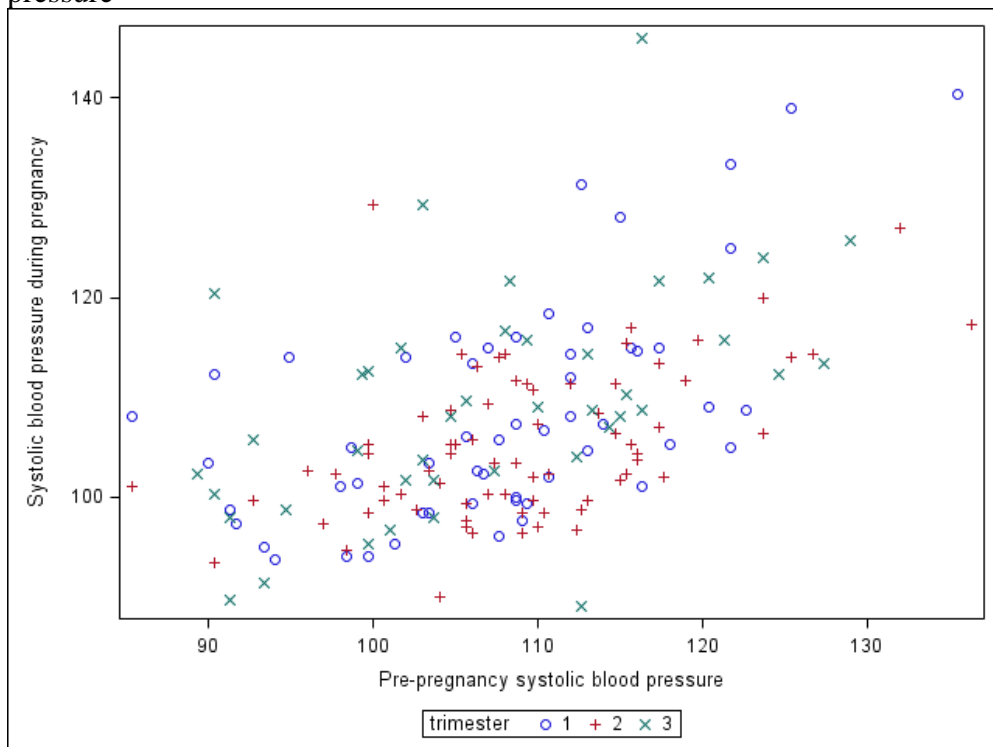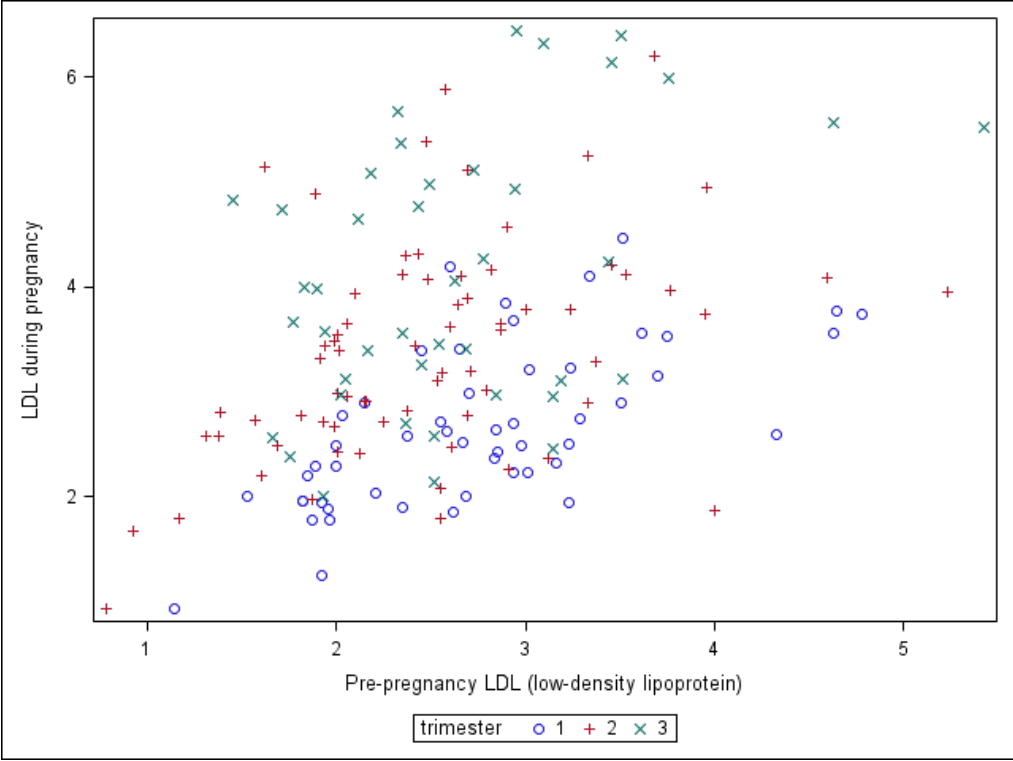
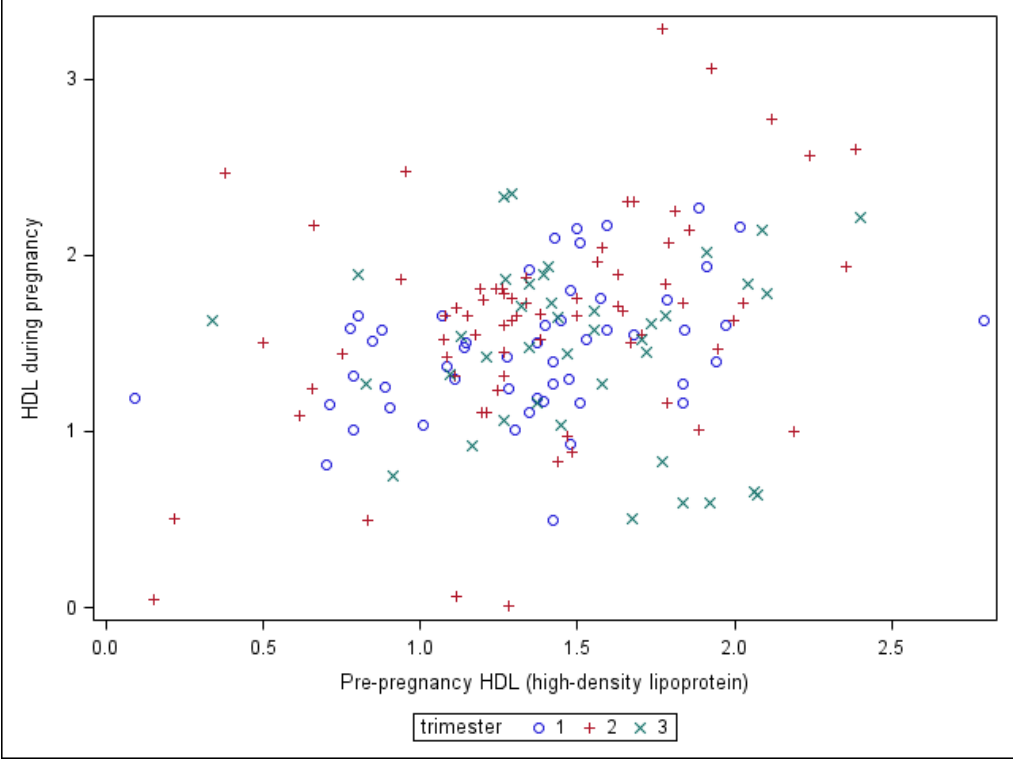Scatterplot 3. During Pregnancy Diastolic Blood Pressure vs. Pre-pregnancy Diastolic Blood Pressure

Scatterplot 4. Total Cholesterol During Pregnancy vs. Pre-pregnancy Total Cholesterol
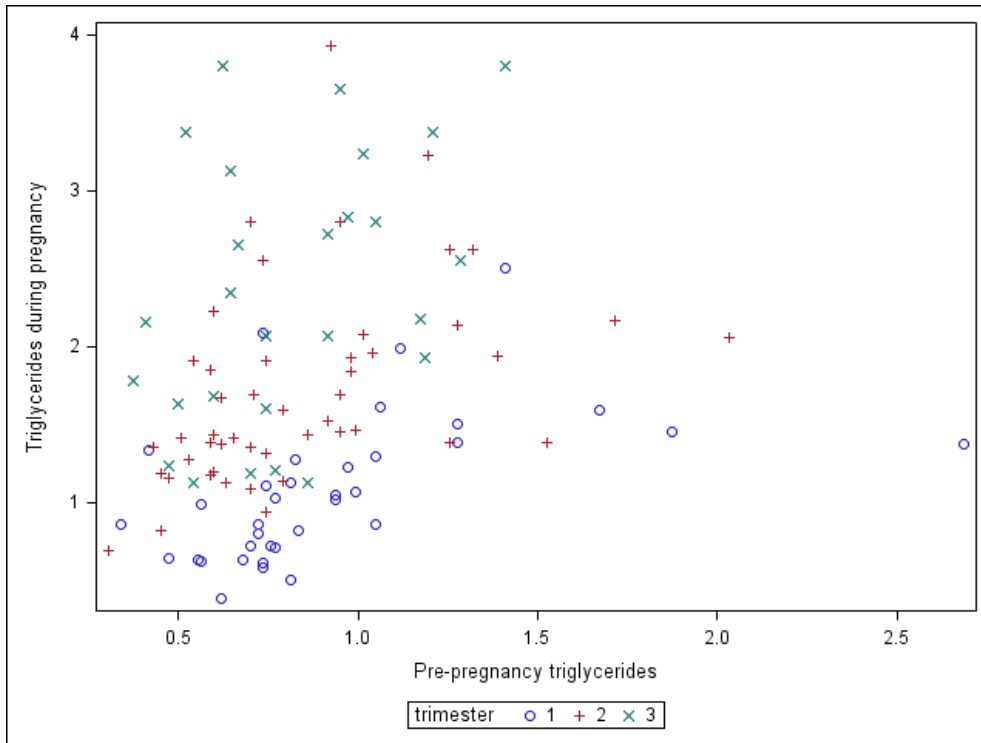

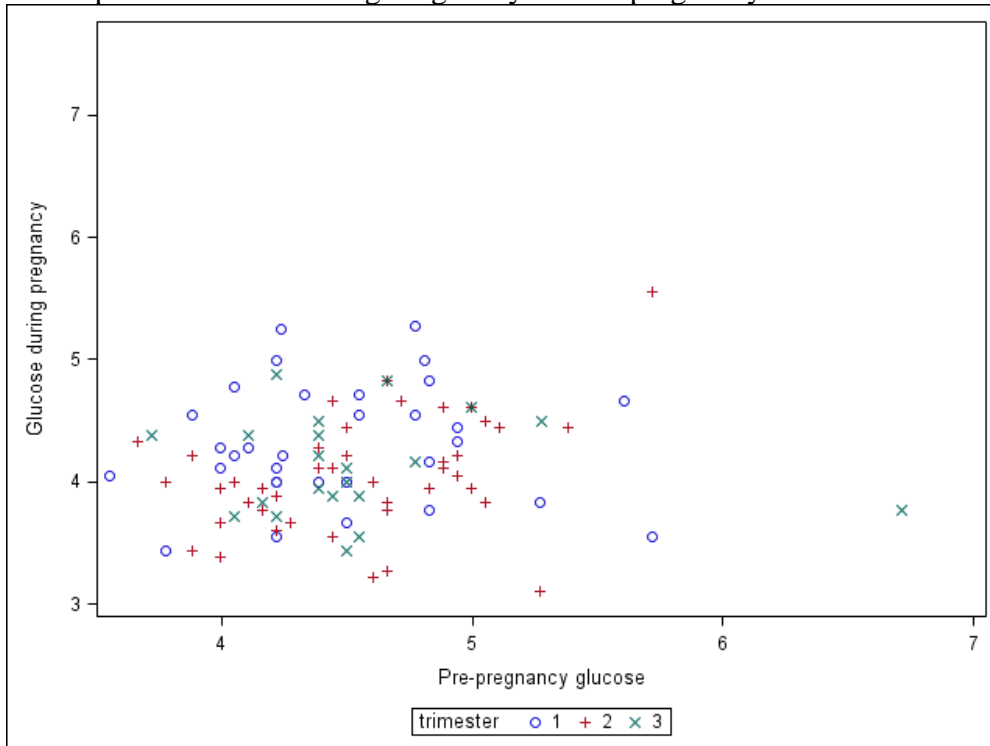Scatterplot 5. LDL during Pregnancy vs. Pre-pregnancy LDL

Scatterplot 6. HDL during Pregnancy vs. Pre-pregnancy HDL

Scatterplot 7. Triglycerides during Pregnancy vs. Pre-pregnancy Triglycerides

Scatterplot 8. Glucose during Pregnancy vs. Pre-pregnancy Glucose

Scatterplot 9. Insulin during Pregnancy vs. Pre-pregnancy Insulin.