Supplemental Online Content

Shiffman D, Louie JZ, Devlin JJ, Rowland CM, Mora S. Concordance of cardiovascular risk factors and behaviors in a multiethnic US nationwide cohort of married couples and domestic partners. *JAMA Netw Open*. 2020;3(10):e2022119. doi:10.1001/jamanetworkopen.2020.22119

This supplemental material has been provided by the authors to give readers additional information about their work.

eMethods

The health assessment program included (1) an online health assessment questionnaire including questions about diet, exercise, smoking, diabetes, and hypertension; (2) measurement of blood pressure, height, weight, and waist circumference by a trained staff in a patient-service center, and (3) a panel of laboratory tests performed on freshly drawn fasting blood samples including high-density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), total cholesterol, triglycerides, glucose, hemoglobin A1c, and cotinine (a biomarker of smoking). Diabetes was defined as having a fasting glucose level >125 mg/dL, hemoglobin A1c >6.4%, or a self-reported physician diagnosis of diabetes. Hypertension was defined as having systolic blood pressure ≥140 mmHg, diastolic blood pressure ≥90 mmHg, or a self-reported physician diagnosis of hypertension. Current smoking status was defined as a positive cotinine test (>2 ng/mL) or a self-reported current smoking status. Former smoking status was defined as negative cotinine test (≤2 ng/mL) and a self-reported former smoking status. Never smoking status was defined as negative cotinine test (≤2 ng/mL) and a self-reported never smoking status. Cotinine test was not performed in 2014. For those with cotinine test in 2015 and 2016, smoking status in 2014 was imputed: for those with cotinine test results in 2015 and 2016, smoking status in 2014 was imputed as follows: (1) For those with a positive cotinine test in 2015 and 2016 a positive cotinine test in 2014 was imputed. (2) For the group of participants who had a positive cotinine test in 2015, a negative test 2016, and a self-reported status of past smoker or never smoker status, a positive cotinine test was randomly assigned to 56% of the group. This fraction (56%) is the percent of participants in the nested prospective study who had a positive cotinine test in 2015 and in 2016, and a negative cotinine in 2017. For all other participants smoking status in at baseline (2014) was deduced from self-reported smoking status. The diet questions in the health assessment questionnaire were similar to, but not identical to the diet score definitions of Life's Simple 7 (LS7). We defined a modified diet score based on self-reported daily servings consumption of 3 food categories: fruits and vegetables (scored as 0 for ≤1 servings, as 1 for 2 to 3 servings, and as 2 for >3 servings), high-fiber foods (scored as 0 for ≤1 servings, as 1 for 2 to 4 servings, and as 2 for >5 servings), and high-fat foods (scored as 2 for ≤1 servings, as 1 for 2 to 3 servings, and as 0 for >3 servings). The diet score was defined as the sum of scores of

these 3 food categories. Physical activity (minutes per week) was assessed as the sum of self-reported minutes of aerobic exercise and strength training per week. Those who reported 5 or more weekly training sessions were assessed as having 5 weekly training sessions. The midpoint of the reported training session duration was used to assess the training session length (e.g., for 1 to 15 minutes, 7.5 minutes were assessed). A 60 minute-session duration was assessed for those who reported 60 or more minutes.

Health Risk Assessment Questionnaire

The following questions are included in an online health risk assessment questionnaire. The questions are presented in a multiple-choice format. Nested questions are only presented following a positive response. Exactly one response is necessary to complete the online questionnaire. In this document, possible responses are comma separated in square brackets.

1. With which racial or ethnic group(s) do you most closely identify? [African-American (non-Hispanic), Asian/Pacific Islanders, Caucasian (non-Hispanic), Latino or Hispanic, Native American, Other, Do not know]
2. Has your doctor ever told you that you have Insulin Dependent Diabetes (Type I): [Yes/No]
    a. For your Type I diabetes are you [Taking Medication?, Under a doctor's care?, Both?, None of the above]

3. Has your doctor ever told you that you have Non-Insulin Dependent Diabetes (Type II): [Yes, No]
    a. For your Type II diabetes are you….. [Taking Medication?, Under a doctor's care?, Both?, None of the above]
4. Has your doctor ever told you that you have Hypertension (high blood pressure): [Yes, No]
    a. For your hypertension (high blood pressure) are you….. [Taking Medication?, Under a doctor's care?, Both?, None of the above]
5. Has your doctor ever told you that you have High Cholesterol [Yes, No]
    a. For your high cholesterol are you….. [Taking Medication?, Under a doctor's care?, Both?, None of the above]

6. Have you ever used tobacco or e-cigarettes? [Yes, No]
    a. Which of the following best describes your usage? [I am an ex-user, I currently use, I am an occasional/social user]
    b. In an average day, how many times do you:
        i. Smoke cigarettes? [0, 1-5 times, 6-10 times, 11-15 times, More than 15 times]
        ii. Smoke cigars? [0, 1-5 times, 6-10 times, 11-15 times, More than 15 times]
        iii. Use smokeless tobacco? [0, 1-5 times, 6-10 times, 11-15 times, More than 15 times]
        iv. Smoke a pipe? [0, 1-5 times, 6-10 times, 11-15 times, More than 15 times]
7. Have many servings of fruits and/or vegetables do you eat per day? [0, 1, 2, 3, 4, more than 4]
8. How many servings of high fiber food do you eat every day, such as whole grain bread and cereal? [0, 1, 2, 3, 4, more than 4]
9. How many servings of high fat foods do you eat every day? [0, 1, 2, 3, 4, 5, more than 5]
10. In an average week how many times do you participate in aerobic exercise? [0, 1, 2, 3, 4, 5 or more times]
    a. When you participate in aerobic exercise on average how long do you exercise? [1-15 minutes, 15-30 minutes, 30-45 minutes, 45-60 minutes, More than 60 minutes]
11. In an average week how many times do you participate in strength training exercise? [0, 1, 2, 3, 4, 5 or more times]
    a. When you participate in strength training exercise on average how long do you exercise? [1-15 minutes, 15-30 minutes, 30-45 minutes, 45-60 minutes, more than 60 minutes]

eTable 1. Spearman correlation and κ (kappa) coefficients for CV health metrics within couples (N = 5364 couples)

	Spearman correlation	Observed Concordance (%)	Expected Concordance (%)	κ coefficient[1]	κ *P* value
Smoking status	NA	85.5	78.5	0.33	<.001
Body mass index	0.29	75.8	68.0	0.24	<.001
Physical activity score	0.39	81.2	71.4	0.34	<.001
Healthy diet score	0.36	92.0	88.9	0.28	<.001
Total cholesterol	0.07	79.6	78.6	0.05	<.001
Blood pressure	SBP: 0.17; DBP: 0.11	78.0	74.4	0.14	<.001
Fasting glucose	0.19	84.8	82.7	0.12	<.001
CV Health score	0.37	86.3	81.0	0.28	<.001

[1]**κ** (kappa) coefficient measures the difference between the observed concordance and the concordance expected by chance. It is scaled such that a 0 indicates that the observed concordance is equal to that expected by chance and 1 indicates a perfect concordance.

Spearman correlation coefficients and κ coefficients were calculated between women and men in different sex couples and between the younger and older members of a couple in same-sex couples.

eTable 2. Baseline characteristic of those who participated in health assessment for 5 consecutive years vs. those who did not

	Completed 5 consecutive years of health assessment	Did not complete 5 consecutive years of health assessment
N	4372	6356
Age	49 (41 - 55)	48 (39 - 56)
Men, n(%)	2186 (50.0)	3167 (49.8)
Body Mass Index, kg/m2	26.6 (23.6 - 30.4)	27.2 (24 - 31.1)
Waist Circumference, cm	88.9 (81.3 - 99.1)	91.4 (81.3 - 99.1)
Smoking status, n(%)		
Current	332 (7.6)	690 (10.9)
Former	698 (16.0)	1129 (17.8)
Never	3342 (76.4)	4537 (71.4)
HDL cholesterol, mg/dL	53 (44 - 66)	53 (43 - 65)
LDL cholesterol, mg/dL	108 (89 - 130)	109 (88 - 130)
Total Cholesterol, mg/dL	188 (166 - 212)	188 (164 - 213)
Triglycerides, mg/dL	102 (73 - 146)	105 (74 - 152)
Fasting Glucose, mg/dL	92 (85 - 99)	92 (85 - 100)
Hypertension, n(%)	1338 (30.6)	1996 (31.4)
Diabetes, n(%)	398 (9.1)	687 (10.8)

Values are median (IQR) unless indicated

eTable 3 Association between newly attained ideal status by one member of a couple with prior year ideal status of the other member

	Unadjusted		Age and sex adjusted	
	OR (95% CI)	P value	OR (95% CI)	P value
Smoking Status	2.2 (1.6 to 3.1)	<.001	2.3 (1.6 - 3.2)	<.001
Body mass index	1.4 (1.1 to 1.8)	0.002	1.6 (1.2 - 2.0)	<.001
Physical activity score	2.0 (1.7 to 2.4)	<.001	2.0 (1.7 - 2.4)	<.001
Healthy diet score	6.1 (4.0 to 9.1)	<.001	6.4 (4.2 - 9.6)	<.001
Total cholesterol	1.1 (1.0 to 1.3)	0.1	1.1 (0.9 - 1.3)	0.31
Blood pressure	1.1 (1.0 to 1.3)	0.07	1.2 (1.0 - 1.4)	0.04
Fasting glucose	1.2 (1.0 to 1.4)	0.09	1.2 (1.0 - 1.4)	0.1
CV Health score	1.9 (1.5 to 2.5)	<.001	2.5 (1.9 - 3.3)	<.001

Attaining ideal status of the risk factor for Member 2 in year t was modeled as a function of the risk factor status of Member 1 in the prior year (t-1) and adjusted for year as well as the sex and prior year age of Member 2.

eFigure 1. Participant flow diagram

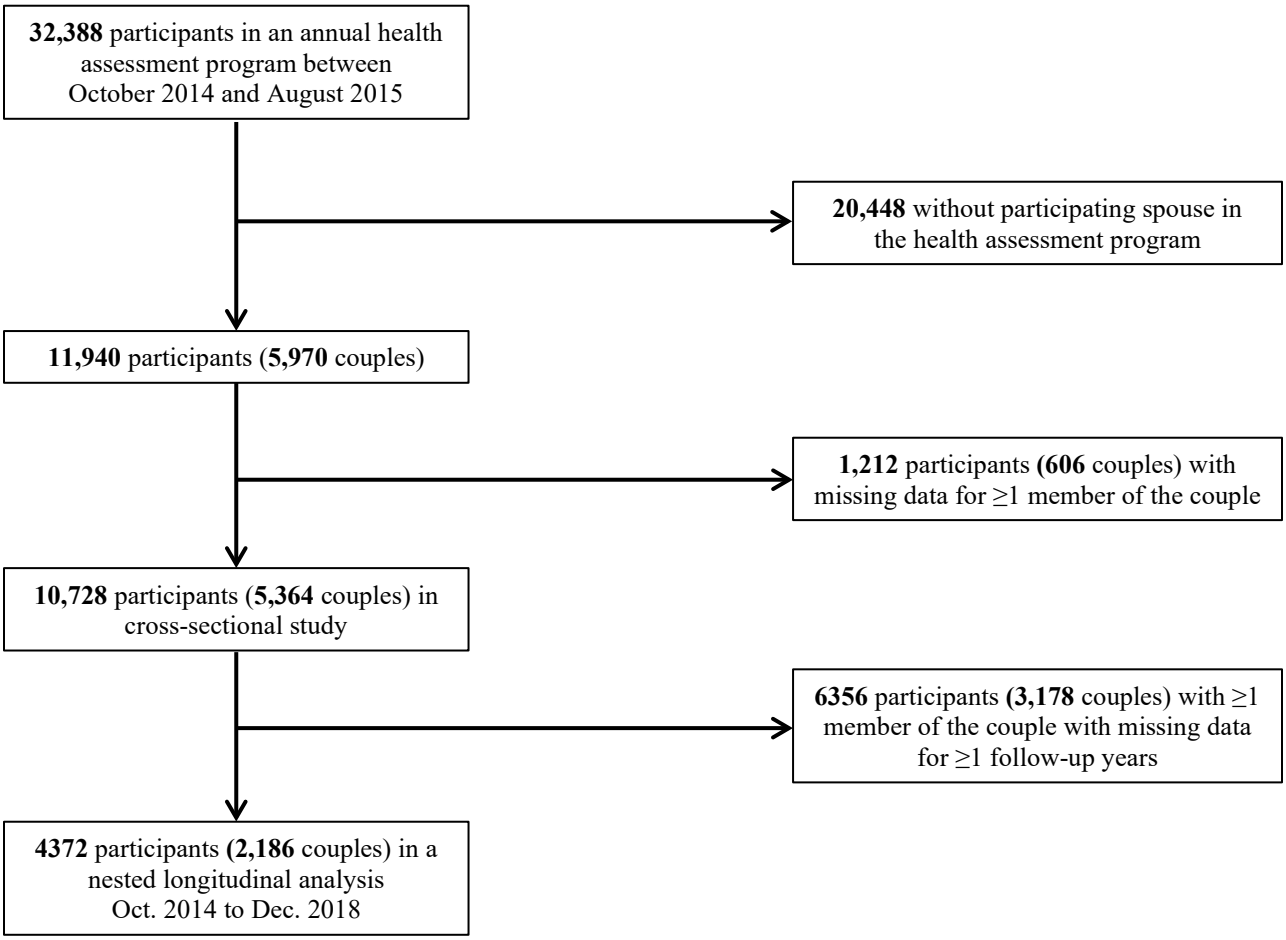
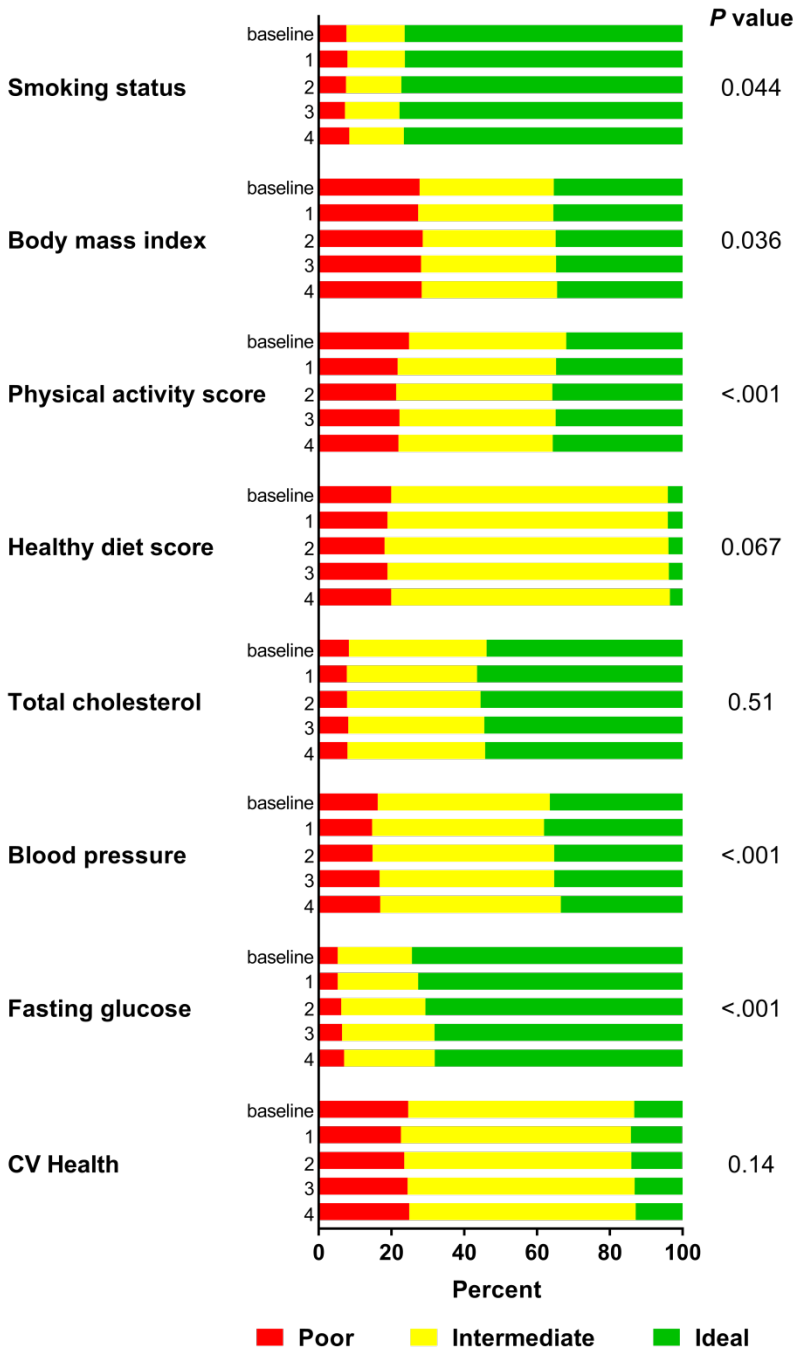
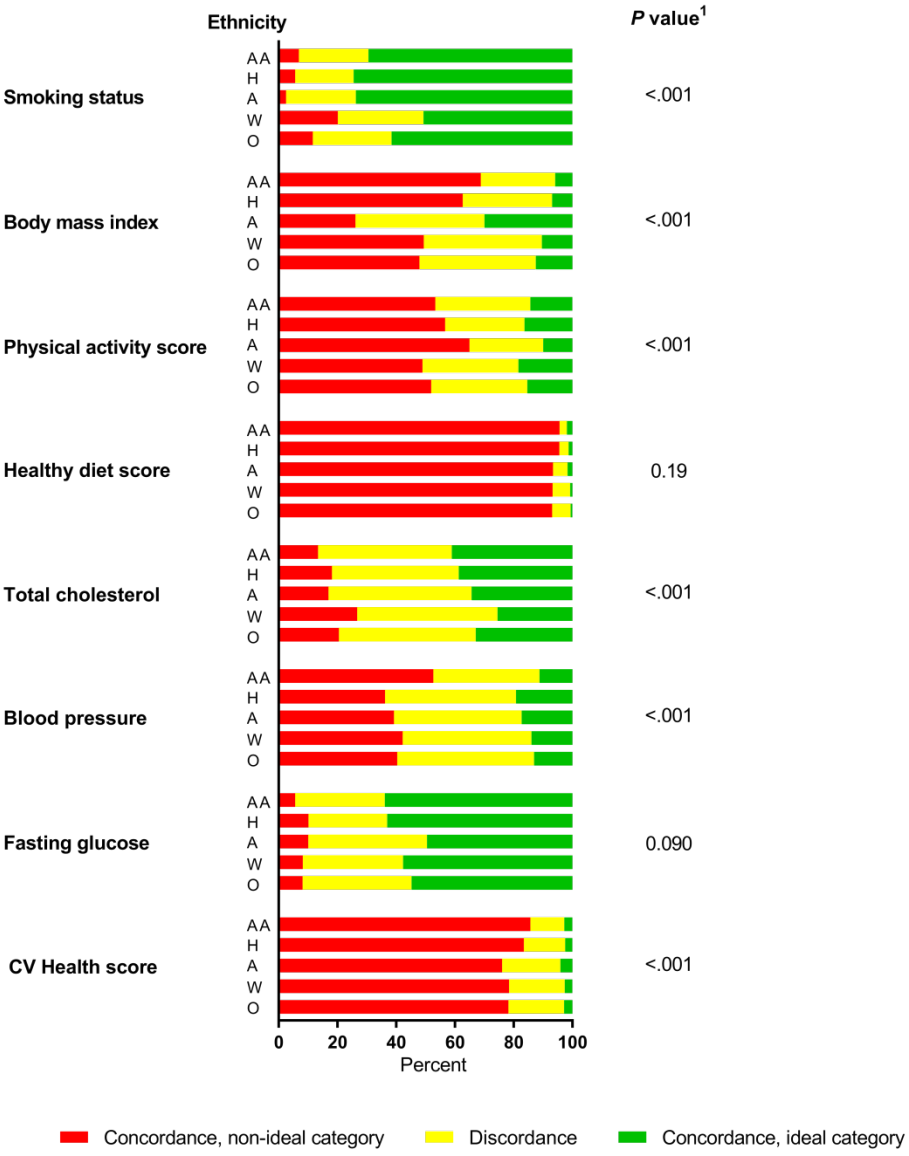


Figure 2. Percent of individual participants in CV risk factors and behaviors categories during 5 years (N= 2,186 couples)



eFigure 2 Legend: Percent of individual in poor (red), intermediate (yellow), and ideal (green) CV risk factors and behaviors categories at baseline and each following year.

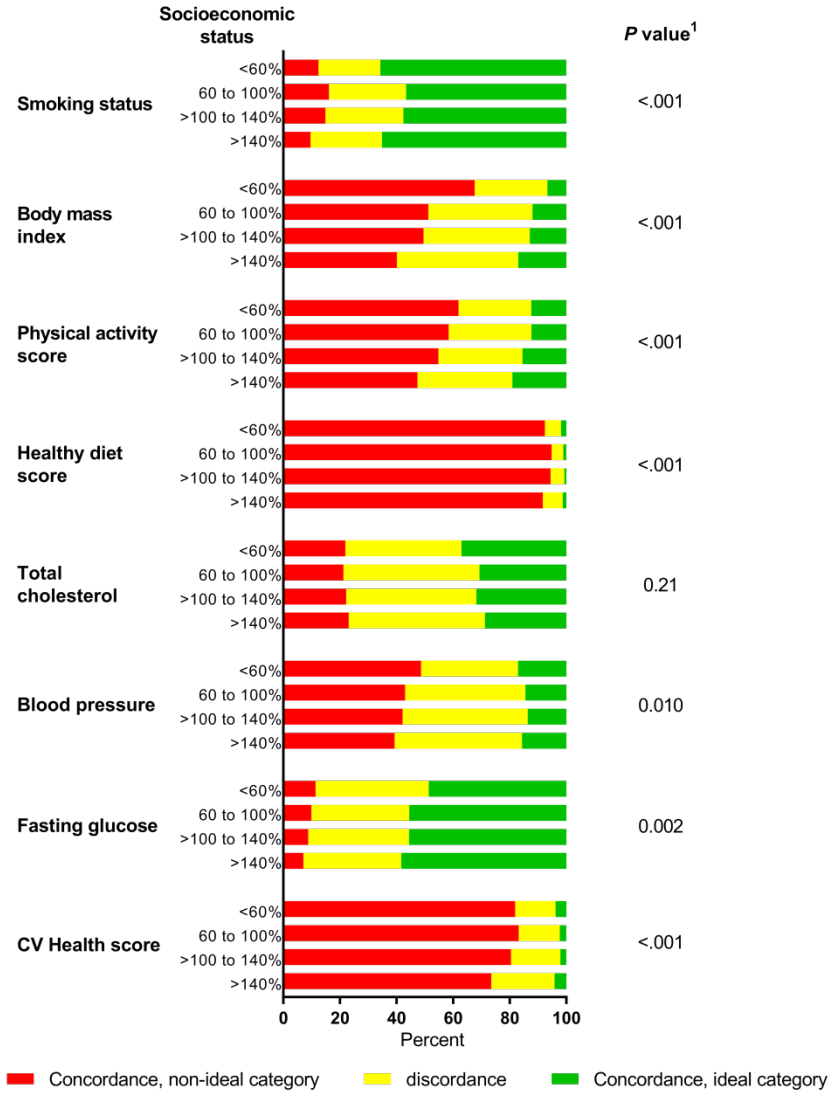
eFigure 3. CV risk factors and behaviors concordance according to ethnicity



[1]Assessing change in fraction of concordance of non-ideal categories according to ethnicity

eFigure 3 legend: *P* values assess whether the fraction in concordance of non-ideal categories within couples varies according to ethnicity. Abbreviations: AA, African American; H, Hispanic; A, Asian; W, White; O, other.

eFigure 4. CV risk factors and behaviors concordance according to socioeconomic status



[1]Assessing change in fraction of concordance of non-ideal categories according to socioeconomic status

eFigure 4 legend: *P* values assess whether the fraction in concordance of non-ideal categories within couples varies according to socioeconomic status. Socio-economic status categories are determined by median income of zip code as percent of state median income.

eFigure 5. CV risk factors and behaviors concordance according to geographic location

eFigure 5 legend: *P* values assess whether the fraction in concordance of non-ideal categories within couples varies according to geographic location. Abbreviations: NE, North east; MW, Midwest; S, South; W, West.