Work-Family Conflict and Ideal Cardiovascular Health Score in the ELSA-Brasil Baseline Assessment

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Background—There are few data about the association between work-related stress and the American Heart Association ideal cardiovascular health (CVH) metrics. We studied the association between work-family conflict (WFC) and ideal CVH scores in the ELSA-Brasil (Brazilian Longitudinal Study of Adult Health) baseline study.

Methods and Results—We analyzed data of active workers (5424 men and 5967 women), aged 35 to 74 years, from 2008 to 2010. Ideal CVH scores were calculated based on the lifestyle and health metrics proposed by the American Heart Association, using data from questionnaires and clinical and laboratory examinations from the ELSA-Brasil study baseline. The WFC questionnaire was based on the Frone model, validated for Brazilian Portuguese. WFC domains (time and strain-based work interference with family, family interference with work, and lack of time for personal care and leisure) and frequency (never to rarely, sometimes, or frequently) were self-reported. Main models were adjusted for age, sex, race, educational level, income, and study site. Positive relative predicted score differences (rPSDs) indicate higher predicted scores. We found lower lifestyle ideal CVH scores among men (rPSD, −5.7%; *P*=0.002) and women (rPSD, −10.2%; *P*<0.001) with frequent lack of time for personal care and leisure. We found lower lifestyle ideal CVH scores among women with frequent strain-based work interference with family (rPSD, −5.1%; *P*=0.002), and family interference with work (rPSD, −8.6%; *P*=0.001). We found higher health ideal CVH scores among men with frequent WFC, which may be attributable to reverse causation.

Conclusions—We found significant associations between WFC and ideal CVH scores. These associations were heterogeneous according to sex. (*J Am Heart Assoc*. 2019;8:e012701. DOI: 10.1161/JAHA.119.012701.)

Key Words: cardiovascular disease risk factors • epidemiology • stress • work • work-family conflict

Cardiovascular disease is responsible for major disease burden worldwide,[1] highlighting the importance of an

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objective evaluation of cardiovascular health (CVH) and its determinants. With this aim, the American Heart Association (AHA)[2] established the CVH score. This score is based on 7 metrics related to lifestyle (diet, physical activity, body mass index, and smoking) and health (blood pressure [BP], fasting plasma glucose, and total cholesterol) factors.

There is evidence that perceived stress is associated with CVH.[3,4] Work is a source of stress for many individuals,[5] and previous studies[4,6–8] report an association between CVH and job stress (usually defined as a combination of high psychological demand, and low decision authority, skill discretion, and social support).

Family-work interface can yield both positive and negative effects on each other. As an example of a positive effect, high levels of family satisfaction and its association with a positive perception of the family role (such as partner support, for example) could help individuals to cope with problems at work.[9] In this article, we focus on work-family conflict, which encompasses negative effects between these 2 dimensions of daily living.

Work-family conflict is classically defined as "a form of inter-role conflict in which the role pressures from the work and family domains are mutually incompatible in some

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Clinical Perspective

What Is New?

- Perceived stress is associated with cardiovascular health.
- There is a lack of information about the association between work-family conflict and the ideal cardiovascular health score.
- We analyzed data from 11 391 active workers, participants of ELSA-Brasil at baseline, and we found lower lifestyle ideal cardiovascular health scores in men and women reporting frequent work-family conflict.

What Are the Clinical Implications?

- Interventions aimed to reduce work-related stress may have potential benefits on cardiovascular health.

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respect."[10,11] The evaluation of work-family conflict comprises directionality (work interfering with family or vice versa) and type of interference (time or strain). A time-based work interference with family occurs when one devotes too much time to work that he/she is unable to cope with family issues. A strain-based work interference with family occurs when job load prevents one from meeting family demands.

Although there are few studies analyzing the association between work-family conflict and CVH, some evidence suggests a negative impact. In a randomized controlled trial, Hurtado et al[12] evaluated the efficacy of an intervention based on improved work-family relationship and schedule control in 1524 healthcare workers. There was a significant reduction of 7.12 cigarettes per week as a result of the intervention. Lallukka et al[13] analyzed data from 3 cohorts to study the association between work-family conflict and unhealthy behaviors. Using data from 4958 participants in the Finnish Helsinki Health Study, they found a positive association between work-family conflict and smoking (among men), and between work-family conflict and unhealthy food habits (among women). Analyzing results from the British Whitehall II study (3397 individuals), they found a positive association between work-family conflict and heavy drinking (among women). No association between work-family conflict and unhealthy behaviors was found analyzing data from the Japanese Civil Servants Study. However, it is important to note that this was the smallest sample in the study (2901 individuals). A previous study from ELSA-Brasil (Brazilian Longitudinal Study of Adult Health)[14] found that self-rated health is worse in women reporting time- and strain-based work interference with family and lack of time for personal care and leisure.

The mechanisms explaining a putative association between work-family conflict and lifestyle or health ideal CVH metrics may differ and are not fully described. Psychological stress may influence lifestyle, promoting the adoption of unhealthy habits, such as smoking[12,13,15–18] and poor diet.[6,13,19,20] On the other hand, BP, glucose, and cholesterol levels may also be influenced by psychological stress, mainly mediated by hormonal changes and low-grade inflammation.[21–24]

Considering that a large proportion of adult life is spent at work, we aimed to explore the association between job-related stress and CVH in the ELSA-Brasil cohort (measured using AHA CVH score). A previous publication from our group[6] analyzed the association between job strain (psychological demands, job control, and social support) and CVH score. In the present article, we studied, in the same cohort, the association between CVH scores and work-family conflict, which comprises another dimension of job-related stress.

The aim of the present study is to analyze the association between work-family conflict and AHA ideal CVH score at the ELSA-Brasil baseline assessment.

Methods

Because of the sensitive nature of the data collected for this study, requests to access the data set from qualified researchers trained in human subject confidentiality protocols may be sent to the corresponding author.

Study Setting and Population

The ELSA-Brasil complete methodology has been previously described.[25–27] In summary, it is a cohort of 15 105 civil servants (12 096 active workers and 3009 retired) from 6 Brazilian state capitals (São Paulo, Belo Horizonte, Porto Alegre, Salvador, Rio de Janeiro, and Vitória). This sample comprises active workers from a wide range of occupational and educational profiles. The baseline assessments took place between August 2008 and December 2010 and comprised information about sociodemographic characteristics, medical history, and classical cardiovascular risk factors, as well as anthropometric and laboratory measurements. The study protocol was approved by the institutional review board from each investigation center. Informed consent was obtained from each patient and the study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki.

Study Sample

Of the 12 096 active workers, we excluded 294 patients (2.4%) who reported previous myocardial infarction, stroke, or coronary revascularization; 5 (<0.1%) patients with missing information on overt cardiovascular disease; 39 (0.3%) patients with missing information on the work-family conflict questionnaire; and 367 (3.0%) patients with missing

information for any ideal CVH metric. Consequently, our sample comprised 11 391 patients included in the analysis.

Ideal CVH Score

Detailed information about the ideal CVH scoring in ELSA-Brasil can be found elsewhere.[27–29] All metrics were scored according to AHA criteria, except for a single modification in the smoking metric for past smokers, as information was gathered about age at quitting. The 7 ideal CVH metrics are (1) diet: 4 adequate components from (a) ≥4 servings of fruit and vegetables per day; (b) ≥7 ounces of fish per week; (c) ≥2 servings of fiber-rich whole grains per day; (d) ≤450 kcal of sugar-sweetened beverages per week; and (e) sodium consumption ≤1500 mg/d; (2) physical activity: ≥75 min/wk of vigorous physical activity, or ≥150 min/wk of moderate physical activity or ≥150 min/wk of moderate+vigorous physical activity; (3) smoking: never smoked or former smoker with age at quitting at least 2 years less than the age at baseline; (4) body mass index: <25 kg/m^2; (5) BP: systolic BP <120 mm Hg and diastolic BP <80 mm Hg, without antihypertensive medication; (6) fasting plasma glucose: <100 mg/dL, without hypo-glycemic medication; and (7) total cholesterol: <200 mg/dL, without lipid-lowering medication.

We evaluated the 7 metrics of the ideal CVH score for each participant and attributed for each metric a score of 0 or 1 point, corresponding to poor or ideal CVH profiles, respectively. The global ideal CVH score was calculated as the sum of the scores for each ideal CVH metric (range: 0–7 points). In addition, we also evaluated 2 subscores, the lifestyle ideal CVH score (range: 0–4 points, including the diet, physical activity, smoking, and body mass index ideal CVH metrics) and the health ideal CVH score (range: 0–3 points, including the BP, fasting plasma glucose, and total cholesterol ideal CVH metrics).[2]

Work-Family Conflict

The work-family conflict model adopted in our cohort is based on a construct elaborated by Frone et al[30] validated for Brazilian Portuguese. Construct validity was assessed by using Kendall's tau correlation coefficients between each of the 4 items of work-family conflict questionnaire and 8 construct-related variables identified in the literature on the subject. Significant correlations were observed in all cases. A test-retest reliability study, with a 2-week interval between responses was also conducted (quadratic weighted kappa coefficients from 0.46 to 0.70).[31] The questionnaire comprises 4 statements about: (1) time-based work interference with family: "Work demands prevent you from spending the desired amount of time with the family."; (2) strain-based work interference with family: "Work demands stop you from

carrying out domestic responsibilities such as taking care of the house and children."; (3) family interference with work: "Family demands interfere with professional responsibilities, such as arriving promptly, fulfilling tasks, not missing appointments, traveling to work, and attending meetings outside regular hours."; and (4) lack of time for personal care and leisure: "Professional and family demands prevent you from using the desired time for your own care and leisure." This last item was not part of the original Frone's model and was developed by ELSA-Brasil researchers based on literature on sex differences regarding the use of time and its reflections on health care.[32,33] The answers were classified according the degree of agreement and frequency, with 5 alternatives provided for each item: "never or almost never," "rarely," "sometimes," "often," and "very often." For analyses, we grouped answers as "never to rarely," "sometimes," or "frequently" (this last answer corresponding to "often" or "very often").

Other Variables

Race was self-defined as black, brown, white, Asian, or native, according to the Brazilian National Census classification. For this study, the Asian and native categories were grouped as "other" because of the low number of participants in these categories. Educational level was stratified as less than high school, high school, and college or above. Monthly family income was stratified as US$ <1245, US$ 1245 to 3319, and US$ ≥3320. Marital status was self-reported as single, widow/divorced, or married. Nonpsychotic mental symptoms were assessed using an adapted Brazilian Portuguese version[34] of the Clinical Interview Schedule-Revised (CIS-R) question-naire.[35] Nature of occupation was defined as manual, routine nonmanual, and nonroutine nonmanual. Study site refers to the ELSA-Brasil investigation center in which the baseline assessment occurred.

Statistical Analyses

Categorical variables were compared using chi-square tests. Quantitative variables were compared using ANOVA or the Kruskal–Wallis test. As there is evidence regarding differences in stress perception between sexes,[33] we also reported our results stratified by sex, even when a statistically significant interaction term was not present. We built crude and adjusted quasi-Poisson regression models to quantify the association between the global, lifestyle, and health ideal CVH score and work-family conflict domains. As detailed earlier[6,27] quasi-Poisson models are derivatives of the classic Poisson model but do not assume that the variance equals the mean estimating dispersion from data. We tested all models for overdispersion or underdispersion

Table 1. Description of the Study Sample

Variable	Men (n=5424)	Women (n=5967)	Total (N=11 391)	P Value
Age, mean±SD, y	49.4±7.4	48.8±7.1	49.1±7.2	<0.001
Self-reported race				
White	2734 (51.0)	2985 (50.5)	5719 (50.7)	<0.001
Brown	1686 (31.5)	1626 (27.5)	3312 (29.4)	
Black	764 (14.3)	1087 (18.4)	1851 (16.4)	
Other	173 (3.2)	217 (3.7)	390 (3.5)	
Educational level				
Up to incomplete high school	804 (14.8)	427 (7.2)	1231 (10.8)	<0.001
High school	1924 (35.5)	2214 (37.1)	4138 (36.3)	
College or above	2696 (49.7)	3326 (55.7)	6022 (52.9)	
Monthly family income, US$				
<1245	1500 (27.7)	1600 (26.9)	3100 (27.3)	<0.001
1245 to 3319	2319 (42.9)	2830 (47.6)	5149 (45.3)	
≥3320	1589 (29.4)	1519 (25.5)	3108 (27.4)	
Marital status				
Single	306 (5.6)	848 (14.2)	1154 (10.1)	<0.001
Widow/divorced	718 (13.2)	1819 (30.5)	2537 (22.3)	
Married	4400 (81.1)	3299 (55.3)	7699 (67.6)	
Nature of occupation				
Manual	1484 (27.7)	612 (10.4)	2096 (18.7)	<0.001
Routine nonmanual	1057 (19.8)	2179 (37.0)	3236 (28.8)	
Nonroutine nonmanual	2809 (52.5)	3093 (52.6)	5902 (52.5)	
CIS-R scores, mean±SD	6.5±6.9	10.1±8.6	8.4±8.0	<0.001
Time-based work interference with family				
Never to rarely	2248 (41.4)	2359 (39.5)	4607 (40.4)	<0.001
Sometimes	1761 (32.5)	1691 (28.3)	3452 (30.3)	
Frequently	1415 (26.1)	1917 (32.1)	3332 (29.3)	
Strain-based work interference with family				
Never to rarely	2939 (54.2)	2698 (45.2)	5637 (49.5)	<0.001
Sometimes	1617 (29.8)	1764 (29.6)	3381 (29.7)	
Frequently	868 (16.0)	1505 (25.2)	2373 (20.8)	
Family interference with work				
Never to rarely	3641 (67.1)	4031 (67.6)	7672 (67.4)	0.47
Sometimes	1385 (25.5)	1535 (25.7)	2920 (25.6)	
Frequently	398 (7.3%)	401 (6.7%)	799 (7.0%)	
Lack of time for personal care and leisure				
Never to rarely	2384 (44.0)	1947 (32.6)	4331 (38.0)	<0.001
Sometimes	1750 (32.3)	1964 (32.9)	3714 (32.6)	
Frequently	1290 (23.8)	2056 (34.5)	3346 (29.4)	
Ideal CVH metrics				
Diet	43 (0.8)	82 (1.4)	125 (1.1)	0.004

Table 1. Continued

Variable	Men (n=5424)	Women (n=5967)	Total (N=11 391)	P Value
Physical activity	1669 (30.8)	1226 (20.5)	2895 (25.4)	<0.001
Smoking	4488 (82.7)	5105 (85.6)	9593 (84.2)	<0.001
Body mass index	1886 (34.8)	2454 (41.1)	4340 (38.1)	<0.001
BP	1800 (33.2)	3242 (54.3)	5042 (44.3)	<0.001
Fasting plasma glucose	1080 (19.9)	2441 (40.9)	3521 (30.9)	<0.001
Total cholesterol	1837 (33.9)	2016 (33.8)	3853 (33.8)	0.94
Ideal CVH score				
Global, mean±SD	2.4±1.3	2.8±1.4	2.6±1.3	<0.001
Lifestyle, mean±SD	1.5±0.8	1.5±0.8	1.5±0.8	0.75
Health, mean±SD	0.9±0.9	1.3±1.0	1.1±0.9	<0.001
Study site				
São Paulo	1815 (33.5)	2003 (33.6)	3818 (33.5)	0.001
Belo Horizonte	1192 (22.0)	1178 (19.7)	2370 (20.8)	
Porto Alegre	620 (11.4)	801 (13.4)	1421 (12.5)	
Salvador	661 (12.2)	808 (13.5)	1469 (12.9)	
Rio de Janeiro	755 (13.9)	776 (13.0)	1531 (13.4)	
Vitória	381 (7.0)	401 (6.7)	782 (6.9)	

Values are expressed as number (percentage) unless otherwise indicated. CIS-R indicates Clinical Interview Schedule-Revised; CVH, cardiovascular health.

and found significant underdispersion in all cases, with dispersion parameters between 0.361 and 0.880 and z scores from −3.7 to −97.5, justifying the use of quasi-Poisson models. Adjusted models are adjusted for age, sex, race, educational level, income, and study site. Based on the quasi-Poisson model estimates, we calculated relative predicted score differences (rPSDs) according to each work-family conflict level. rPSDs correspond to the expected change in the ideal CVH score associated with work-family conflict. Positive rPSD values indicate higher ideal CVH scores.

After detecting significant associations between frequent work-family conflict and ideal CVH scores, we built post hoc quasi-Poisson regression models with further adjustment for CIS-R score and marital status. We also built post hoc quasi-Poisson regression models with interaction terms to analyze whether these associations were heterogeneous according to the nature of occupation. In addition, we built crude and adjusted Poisson regression models with robust error estimates to calculate prevalence ratios associated with work-family conflict domains and frequency for each ideal CVH metric. We also present which associations remain significant in multiple models after Holm-Bonferroni correction for multiple comparisons. The statistical analysis was performed using R software (version 3.5.0). The significance level was set at 0.05.

Results

The characteristics of the study sample, grouped by sex, are described in Table 1. Men reported less time- and strain-based work interference with family and less lack of time for personal care and leisure than women ($P<0.001$ for all). There was no significant difference between sexes for family interference with work ($P=0.47$). Global and health ideal CVH scores were significantly higher for women ($P<0.001$ for both). There was no significant difference in lifestyle ideal CVH scores between sexes ($P=0.75$).

Tables 2 and 3 show results from adjusted regression models (crude model results are presented in Tables S1 and S2). In all models, participants who reported "never to rarely" work-family conflict frequency (within each work-family conflict domain) are the reference group. Table 2 shows the results of the quasi-Poisson model estimating the association between work-family conflict and ideal CVH scores (as a discrete variable). We observed lower global ideal CVH scores in individuals who reported frequent lack of time for personal care and leisure when analyzing the entire sample (rPSD, −2.9%; $P=0.013$) or women in separate (rPSD, −4.6%; $P=0.002$), but not men (rPSD, −0.3%; $P=0.89$). In addition, men with frequent strain-based work interference with family had higher global ideal CVH scores (rPSD, 4.1%; $P=0.044$). With further adjustment for CIS-R scores and marital status,

Table 2. Adjusted Relative Predicted Score Differences (95% CIs) for Ideal CVH Scores According to Work-Family Conflict Domains and Frequency

Work-Family Conflict Domains and Frequency		All Sample	Men	Women
Global ideal CVH score				
Time-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	1.1% (−1.1% to 3.3%)	2.1% (−1.2% to 5.6%)	0.1% (−2.7% to 3.0%)
	Frequently	0.9% (−1.3% to 3.2%)	1.4% (−2.2% to 5.1%)	0.6% (−2.2% to 3.4%)
Strain-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	1.9% (−0.2% to 4.1%)	1.3% (−1.9% to 4.6%)	2.1% (−0.6% to 5.0%)
	Frequently	0.6% (−1.7% to 3.0%)	4.1% (0.1%–8.4%)*	−1.3% (−4.1% to 1.6%)
Family interference with work	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	−0.1% (−2.2% to 2.0%)	0.8% (−2.4% to 4.1%)	−0.6% (−3.2% to 2.1%)
	Frequently	−0.7% (−4.2% to 2.9%)	−0.3% (−5.7% to 5.3%)	−1.5% (−6.1% to 3.2%)
Lack of time for personal care and leisure	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	0.5% (−1.7% to 2.7%)	1.0% (−2.3% to 4.4%)	0.0% (−2.8% to 3.0%)
	Frequently	−2.9% (−5.1% to −0.6%)*	−0.3% (−3.8% to 3.5%)	−4.6% (−7.3% to −1.8%)*
Lifestyle ideal CVH score				
Time-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	−0.1% (−2.4% to 2.2%)	0.9% (−2.4% to 4.3%)	−1.2% (−4.3% to 2.0%)
	Frequently	−1.4% (−3.7% to 0.9%)	−0.5% (−4.0% to 3.1%)	−2.3% (−5.3% to 0.8%)
Strain-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	−0.3% (−2.5% to 1.9%)	0.7% (−2.5% to 4.0%)	−1.4% (−4.4% to 1.7%)
	Frequently	−2.4% (−4.9% to 0.1%)	1.4% (−2.6% to 5.5%)	−5.1% (−8.1% to −1.9%)*
Family interference with work	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	−1.3% (−3.4% to 0.9%)	−0.1% (−3.3% to 3.2%)	−2.0% (−4.9% to 0.9%)
	Frequently	−5.0% (−8.6% to −1.2%)*	−1.6% (−6.8% to 4.0%)	−8.6% (−13.5% to −3.5%)*,†
Lack of time for personal care and leisure	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	−0.6% (−2.9% to 1.7%)	0.3% (−2.9% to 3.6%)	−1.8% (−4.9% to 1.4%)
	Frequently	−8.2% (−10.4% to −6.0%)*,†	−5.7% (−9.1% to −2.1%)*	−10.2% (−13.1% to −7.2%)*,†
Health ideal CVH score				
Time-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	2.9% (−0.8% to 6.7%)	4.2% (−1.9% to 10.8%)	1.8% (−2.6% to 6.4%)
	Frequently	4.4% (0.6%–8.3%)*	4.7% (−1.9% to 11.8%)	4.1% (−0.3% to 8.7%)
Strain-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	5.0% (1.4%–8.7%)*	2.3% (−3.6% to 8.6%)	6.3% (1.9%–10.9%)*
	Frequently	4.9% (0.9%–9.1%)*	8.9% (1.4%–17.0%)*	3.3% (−1.2% to 8.0%)
Family interference with work	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)

Continued

Table 2. Continued

Work-Family Conflict Domains and Frequency		All Sample	Men	Women
	Sometimes	1.5% (−2.0% to 5.0%)	2.4% (−3.5% to 8.7%)	1.1% (−3.0% to 5.3%)
	Frequently	5.1% (−0.9% to 11.5%)	1.9% (−7.9% to 12.8%)	6.6% (−0.6% to 14.4%)
Lack of time for personal care and leisure	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	2.3% (−1.5% to 6.1%)	2.3% (−3.8% to 8.8%)	2.3% (−2.2% to 7.0%)
	Frequently	4.8% (0.9%–8.8%)*	9.5% (2.5%–17.1%)*	2.3% (−2.2% to 7.0%)

All models are adjusted for age, sex, race, educational level, income, and study site. CVH indicates cardiovascular health.

*$P<0.05$.

†$P<0.05$ after Holm-Bonferroni correction for multiple comparisons

most of the significant associations with global ideal CVH scores disappeared, except for the association with frequent strain-based work interference with family in men (rPSD, 5.9%; $P=0.005$).

Analyzing models using lifestyle ideal CVH scores as the dependent variable revealed heterogeneous patterns. We observed significantly lower lifestyle ideal CVH scores in individuals with frequent family interference with work (rPSD, −5.0%; $P=0.010$), and frequent lack of time for personal care and leisure (rPSD, −8.2%; $P<0.001$). After stratification by sex, we observed significantly lower lifestyle ideal CVH scores in women with frequent strain-based work interference with family (rPSD, −5.1%; $P=0.002$), frequent family interference with work (rPSD, −8.6%; $P=0.001$), and frequent lack of time for personal care and leisure (rPSD, −10.2%; $P<0.001$). In men, we only observed significantly lower lifestyle ideal CVH scores in those with frequent lack of time for personal care and leisure (rPSD, −5.7%; $P=0.002$). With further adjustment for CIS-R scores and marital status, we still observed significantly lower lifestyle ideal CVH scores in individuals with frequent family interference with work when both sexes were analyzed (rPSD, −5.1%; $P<0.001$), women in separate (rPSD, −6.8%; $P<0.001$). The association between lower lifestyle ideal CVH scores and frequent family interference with work among women was of borderline significance (rPSD, −5.3%; $P=0.051$). The other associations lost statistical significance after further adjustment for CIS-R scores and marital status.

In addition, we observed higher health ideal CVH scores among individuals with frequent time-based (rPSD, 4.4%; $P=0.023$) and strain-based (rPSD, 4.9%; $P=0.016$) work interference with family, and among individuals with lack of time for personal care and leisure (rPSD, 4.8%; $P=0.016$). In men, we found higher health ideal CVH scores among individuals with frequent strain-based work interference with family (rPSD, 8.9%; $P=0.020$), and among individuals with lack of time for personal care and leisure (rPSD, 9.5%; $P=0.007$). Health ideal CVH scores were not associated with frequent work-family conflict in women. The significant associations between health ideal CVH scores and frequent work-family conflict remained after further adjustment for CIS-R and marital status.

It is important to emphasize, however, that although we describe some statistically significant associations occurring for one sex and not the other, only the association between family interference with work and lifestyle ideal CVH scores presented a significant interaction term according to sex ($P=0.040$).

We also performed post hoc models with interaction terms to analyze whether the significant associations between frequent work-family conflict and ideal CVH scores were heterogeneous according to the nature of occupation

Table 3. Adjusted Prevalence Ratios (95% CIs) for the Association Between Work-Family Conflict and Ideal CVH Metrics

	Work-Family Conflict Domains and Frequency		Diet	Physical Activity	Body Mass Index	Smoking	BP	Glucose	Total Cholesterol
All sample	Time-based work interference with family	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.11 (0.71–1.75)	0.97 (0.90–1.05)	1.00 (0.94–1.05)	1.01 (0.99–1.03)	1.06 (1.01–1.11)*	0.97 (0.91–1.04)	1.03 (0.97–1.10)
		Frequently	1.17 (0.76–1.81)	0.92 (0.85–0.998)*	0.96 (0.90–1.01)	1.02 (1.00–1.04)	1.07 (1.02–1.12)*	1.00 (0.94–1.06)	1.06 (0.99–1.12)
	Strain-based work interference with family	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.02 (0.67–1.54)	0.94 (0.88–1.01)	1.02 (0.97–1.08)	1.00 (0.99–1.02)	1.07 (1.02–1.12)*	1.02 (0.96–1.08)	1.05 (0.99–1.12)
		Frequently	0.99 (0.63–1.57)	0.88 (0.81–0.96)*	0.96 (0.90–1.02)	1.01 (0.99–1.03)	1.06 (1.01–1.12)*	1.02 (0.95–1.09)	1.06 (0.99–1.13)
	Family interference with work	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.11 (0.74–1.66)	0.99 (0.93–1.07)	0.98 (0.93–1.04)	0.99 (0.97–1.00)	1.01 (0.97–1.06)	1.04 (0.98–1.10)	1.00 (0.94–1.06)
		Frequently	1.10 (0.54–2.27)	0.76 (0.66–0.88)*,†	1.02 (0.93–1.12)	0.97 (0.94–1.00)	1.05 (0.97–1.13)	1.07 (0.96–1.18)	1.04 (0.94–1.15)
	Lack of time for personal care and leisure	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	0.90 (0.58–1.40)	0.97 (0.90–1.04)	1.03 (0.97–1.09)	0.99 (0.97–1.01)	1.03 (0.98–1.08)	1.05 (0.98–1.12)	0.99 (0.93–1.06)
		Frequently	0.91 (0.58–1.43)	0.66 (0.61–0.72)*,†	0.94 (0.88–0.995)*	1.00 (0.98–1.02)	1.09 (1.04–1.15)*,†	1.01 (0.95–1.08)	1.02 (0.96–1.09)
Men	Time-based work interference with family	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	0.84 (0.39–1.81)	1.04 (0.95–1.15)	0.97 (0.89–1.05)	1.02 (0.99–1.05)	1.10 (1.01–1.20)*	0.91 (0.81–1.04)	1.06 (0.97–1.16)
		Frequently	1.03 (0.49–2.18)	1.00 (0.90–1.10)	0.93 (0.85–1.02)	1.02 (0.99–1.05)	1.06 (0.96–1.16)	1.00 (0.88–1.14)	1.06 (0.97–1.17)
	Strain-based work interference with family	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.26 (0.65–2.45)	1.00 (0.92–1.10)	0.99 (0.91–1.08)	1.01 (0.98–1.04)	1.08 (0.99–1.17)	0.93 (0.82–1.05)	1.02 (0.94–1.11)
		Frequently	0.71 (0.27–1.91)	1.00 (0.90–1.12)	1.00 (0.90–1.11)	1.03 (0.99–1.06)	1.08 (0.97–1.19)	1.14 (0.99–1.31)	1.07 (0.96–1.19)
	Family interference with work	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.46 (0.77–2.76)	1.02 (0.94–1.12)	1.02 (0.94–1.11)	0.98 (0.95–1.00)	1.03 (0.95–1.12)	1.06 (0.94–1.20)	1.00 (0.92–1.09)
		Frequently	0.86 (0.20–3.60)	0.86 (0.73–1.03)	1.10 (0.96–1.26)	0.98 (0.93–1.03)	0.99 (0.85–1.15)	1.13 (0.93–1.38)	0.98 (0.85–1.14)
	Lack of time for personal care and leisure	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.06 (0.49–2.29)	1.06 (0.97–1.16)	1.00 (0.92–1.09)	0.98 (0.95–1.01)	0.99 (0.91–1.09)	1.07 (0.94–1.22)	1.02 (0.94–1.12)
		Frequently	1.36 (0.63–2.96)	0.73 (0.65–0.82)*,†	0.98 (0.89–1.08)	1.01 (0.98–1.04)	1.11 (1.01–1.22)*	1.16 (1.01–1.32)*	1.07 (0.96–1.19)
Women	Time-based work interference with family	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.31 (0.75–2.29)	0.87 (0.77–0.99)*	1.02 (0.95–1.10)	1.00 (0.97–1.03)	1.04 (0.98–1.10)	1.01 (0.93–1.08)	1.00 (0.92–1.09)
		Frequently	1.27 (0.74–2.17)	0.83 (0.73–0.93)*	0.98 (0.91–1.05)	1.01 (0.99–1.04)	1.06 (1.01–1.12)	1.00 (0.93–1.07)	1.05 (0.97–1.14)
	Strain-based work interference with family	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	0.90 (0.53–1.53)	0.85 (0.76–0.96)*	1.04 (0.97–1.11)	1.00 (0.97–1.02)	1.06 (1.003–1.11)*	1.06 (0.99–1.14)	1.07 (0.99–1.16)
		Frequently	1.07 (0.64–1.81)	0.75 (0.66–0.85)*,†	0.94 (0.87–1.02)	1.01 (0.98–1.03)	1.05 (1.00–1.11)	0.99 (0.92–1.07)	1.05 (0.97–1.15)

Continued

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Table 3. Continued

Work-Family Conflict Domains and Frequency		Diet	Physical Activity	Body Mass Index	Smoking	BP	Glucose	Total Cholesterol
Family interference with work	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
	Sometimes	0.93 (0.55–1.58)	0.96 (0.86–1.08)	0.96 (0.90–1.03)	0.99 (0.97–1.02)	1.00 (0.95–1.05)	1.02 (0.96–1.10)	1.01 (0.93–1.09)
	Frequently	1.24 (0.53–2.85)	0.61 (0.47–0.79)*,†	0.95 (0.84–1.07)	0.96 (0.92–1.01)	1.08 (0.99–1.17)	1.04 (0.93–1.17)	1.08 (0.95–1.23)
Lack of time for personal care and leisure	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
	Sometimes	0.81 (0.48–1.38)	0.83 (0.74–0.94)*	1.06 (0.98–1.14)	0.99 (0.96–1.02)	1.05 (0.99–1.11)	1.03 (0.96–1.11)	0.97 (0.89–1.06)
	Frequently	0.73 (0.42–1.26)	0.57 (0.51–0.65)*,†	0.92 (0.85–0.99)	0.99 (0.96–1.02)	1.08 (1.02–1.14)*	0.96 (0.89–1.04)	1.01 (0.93–1.10)

All models are adjusted for age, sex, race, educational level, income, and study site. BP indicates blood pressure; CVH, cardiovascular health.
*P<0.05.
†P<0.05 after Holm-Bonferroni correction for multiple comparisons.

(manual, routine nonmanual and nonroutine nonmanual). There were no significant interaction terms in these models at the 0.05 level. We found interaction terms with borderline significance for the association between lifestyle ideal CVH metrics and: (1) frequent family interference with work in the entire sample (*P*=0.051); (2) frequent lack of time for personal care and leisure in the entire sample (*P*=0.075); and (3) frequent lack of time for personal care and leisure among men (*P*=0.086). Table S3 shows the adjusted relative predicted score differences for the association between lifestyle ideal CVH scores and these 2 work-family conflict domains, stratified by the nature of occupation. In most cases, the strength of the association is slightly milder in individuals who perform manual work, although, as stated, no differences were significant at the 0.05 level.

Table 3 shows the association between work-family conflict and ideal CVH metrics. For the entire sample, ideal physical activity was negatively associated with frequent time-based work interference with family (prevalence ratio [PR], 0.92; *P*=0.045), strain-based work interference with family (PR, 0.88; *P*=0.003), family interference with work (PR, 0.76; *P*<0.001), and lack of time for personal care and leisure (PR, 0.66; *P*<0.001). These associations were all significant for women. Men reporting frequent lack of time for personal care and leisure also presented lower prevalence of ideal physical activity. On the other hand, in the whole sample, positive associations were observed between ideal BP and frequent time-based work interference with family (PR, 1.07; *P*=0.007), frequent strain-based work interference with family (PR, 1.06; *P*=0.015), and frequent lack of time for personal care and leisure (PR, 1.09; *P*<0.001).

Discussion

We found significant associations between work-family conflict and ideal CVH scores, with heterogeneity between sexes and ideal CVH score domains. Lifestyle ideal CVH scores were lower among women with frequent strain-based work interference with family, individuals with frequent family interference with work (for all sample and among women), and individuals with frequent lack of time for personal care and leisure (all sample and for both sexes in separate). Considering each metric separately, most significant differences were caused by a lower prevalence of ideal physical activity in individuals with frequent work-family conflict.

Significant associations with health ideal CVH scores were in the opposite direction. Health ideal CVH scores were higher in individuals with frequent time-based work interference with family (analyzing all sample, but without enough power to detect significant associations after stratification by sex), in those with frequent strain-based work interference with family (all sample and in men), and those with frequent lack of time

for personal care and leisure (similarly, in all sample and in men). Considering each metric separately, most significant differences were caused by a higher prevalence of ideal BP in individuals with frequent work-family conflict.

The paradoxical association between lack of time for personal care and leisure and health ideal CVH scores may be explained by some characteristics of our setting. ELSA-Brasil is a cohort of public civil servants in Brazil. There are federal labor laws ensuring the right to take time off for medical consultations or clinical examinations. On the other hand, there is no law that allows workers time for nonmedical based self-care, eg, to engage in healthy physical activity. From this point of view, the more clinically compromised the individual, the more time is allowed for self-care. This may partially explain why individuals with worse health ideal CVH profiles may be less likely to report lack of time for personal care and leisure. In addition, this may be accompanied by a different perception of what time for personal care represents for subjects who emphasize time needed for healthy lifestyle habits and what it represents for those who may prioritize time for consultations and examinations, a profile that has been previously associated with individuals reporting work-family conflict.[32]

We also found a positive association between frequent strain-based work interference with family and health ideal CVH scores in men. We can hypothesize that individuals with suboptimal clinical statuses may avoid or be spared from working in highly demanding jobs. If this is the case, the positive association between strain-based work interference with family and health ideal CVH scores may be at least partially attributable to reverse causation.

There are no previous data about the association between AHA health ideal CVH score and work-family conflict that could allow us to make direct comparisons. However, we may compare our results with the findings from authors who analyzed the association between work-family conflict and BP, glucose, and cholesterol levels, in separate or in composite scores (eg, using the Framingham coronary heart disease risk score). Berkman et al[36] analyzed data from 1406 female and 118 male nursing employees and described a small but statistically significant rise in cardiometabolic risk (using the Framingham risk score) associated with work interference with family (but not family interference with work). Versey et al[37] did not find an association between work-family conflict and BP in 630 participants of the Midlife in the United States Survey. Javaid et al[38] analyzed 277 Malaysian technical workers, who did not smoke and were not taking medication, and found no association between work-family conflict and mean arterial pressure. Although it is important to emphasize the limitations of comparing our analyses to these previous data, they reinforce our conclusion that the paradoxical association between frequent work-family conflict

and health ideal CVH scores may be attributable to reverse causation.

On the other hand, we observed that strain-based work interference with family and family interference with work were negatively associated with lifestyle ideal CVH score in women. Additionally, we observed a significant interaction term between family interference with work and sex, suggesting that lifestyle CVH metrics in women may be more affected by this source of stress than in men. This putative higher burden of work-family conflict for women may be partially explained by cultural factors. Despite sex-based roles losing some ground worldwide and in Brazil, and the increase of women in the workforce, women tend to devote themselves more to family compared with men.[11,39] It is reasonable to think that when the demands of family and work are incompatible, this may result in impaired self-care.

Analyzing lifestyle ideal CVH metrics separately, we found that nonideal physical activity was mostly associated with work-family conflict in both women (all domains) and men (lack of time for personal care and leisure). The absence of studies focusing the association between work-family conflict and ideal CVH scores impairs direct comparisons. However, it is possible to compare our results with the findings from others analyzing the association between this source of stress and the parameters used in the lifestyle ideal CVH score. Our results are consistent with the findings of Roos et al,[40] who analyzed data from a Finnish cohort of 5346 employees (4289 women) and observed that work interference with family was associated with less physical activity in both men and women (odds ratio, 0.54 and 0.76, respectively). Women also presented a significant association between physical activity and family interference with work (odds ratio, 0.77). However, they observed an association between nonideal diet and family interference with work measures that we did not find in our sample. Ideal diet, according to AHA criteria, has a low prevalence,[41] being found in ≈1% of the ELSA-Brasil sample,[27] which may have reduced our power to observe significant associations with this metric.

In contrast to other smaller studies, we did not find an association between nonideal smoking and work-family conflict. In a sample of 423 workers, Macy et al[17] found a significant association between higher cigarette consumption and work interference with family (both sexes) and family interference with work (in women). Nelson et al[18] analyzed data from 439 participants (82.5% women, 19.3% smokers) and found that people who had bidirectional work-family conflict (work interfering with family and family interfering with work simultaneously) had higher odds (3.1) of smoking compared with those with no work-family conflict. It is possible that our negative findings for these associations are also partly caused by study sample characteristics and the low frequency of the nonideal smoking metric, reflecting successful anti-tobacco initiatives in Brazil in recent decades.[27,42]

Applying Holm-Bonferroni correction for multiple comparisons highlighted some findings in our analyses, while, as expected, other associations lost significance. Lower lifestyle ideal CVH scores remained associated with frequent family interference with work (among women), and with frequent lack of time for personal care and leisure (for the whole sample and among women). Analyzing individual ideal CVH metrics in separate, after correction for multiple comparisons, there was a lower prevalence of ideal physical activity in individuals with frequent family interference with work and those with frequent lack of time for personal care and leisure. Analyses stratified by sex showed that women with frequent strain-based work interference with family, frequent family interference with work, or frequent lack of time for personal care and leisure, and men with frequent lack of time for personal care and leisure also had a lower prevalence of ideal physical activity. For all other metrics, only the higher prevalence of ideal BP in individuals with frequent lack of time for personal care and leisure remained significant. Although this enforces some of the main messages from this article, there are some reasons to consider that adopting multiple comparison testing in this scenario may be a too-stringent criterion. First, the hypotheses tested throughout the article are not independent from each other. For example, as global CVH scores are the sum of lifestyle and health CVH scores, testing the association between work-family conflict domains and these variables may not inflate global alpha error as much as studying 3 completely unrelated associations. This logic is also valid when studying the association between work-family conflict domains and each CVH metric in separate, or when stratifying by sex. Second, most associations with CVH scores are equal or more intense in individuals with "frequent" work-family conflict (in each domain) compared with those who report work-family conflict "sometimes," suggesting a dose-response pattern.

Study Strengths and Limitations

Our study has some strengths. There are still few studies about work-family conflict and cardiovascular risk factors, and this is the first to evaluate and measure the specific association between work-family conflict and multiple lifestyle (diet, physical activity, body mass index, and smoking) and health (BP, fasting plasma glucose, and cholesterol) parameters in a large multicenter sample. We were able to apply the AHA criteria for the ideal CVH score with minimal adaptations. Regarding work-family conflict measures, we not only evaluated directionality (work to family or family to work) and type of conflict (time- or strain-based), but also a recently developed parameter, lack of time for personal care and leisure, with a questionnaire that was validated for Brazilian Portuguese.

It is also important to interpret our results in the context of the limitations of this study. Measurements of work-family conflict were self-reported, and, therefore, subject to participants' interpretation of their context. Aspects of intentionality, as intentional compensation (intentional shift of involvement from the least satisfactory side of the work-family interface to the other side) or unintentional mood spillover (unintentional effects of mood in one side of the work-family interface on the other side)[11] were not assessed. It is arguable that the measurement of such aspects would help to clarify some of the positive associations found in our study. Because of the cross-sectional design of this study, it was not possible to assess temporality, increasing the risk of reverse causation. We believe reverse causation is the most probable cause for the positive association between work-family conflict and health ideal CVH metrics, as discussed.

Conclusions

We found significant negative associations between work-family conflict and lifestyle ideal CVH scores in this large multicenter sample. These associations were more evident in women. Considering each metric separately, more consistent associations occurred with the physical activity ideal CVH metric. Follow-up data from the ELSA-Brasil and other cohorts may give us a better understanding of the impact of these associations over time.

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Disclosures

None.

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SUPPLEMENTAL MATERIAL

Table S1. Crude relative predicted scores differences (95% confidence intervals) for ideal CVH scores according to work-family conflict domains and frequency.

	Work-family conflict domains and frequency		All sample	Men	Women
Global ideal CVH score	Time-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	**3.6% (1.3% ; 6.0%)**	**3.8% (0.3% ; 7.4%)**	**4.2% (1.0% ; 7.4%)**
		Frequently	**6.2% (3.8% ; 8.7%)**	**4.9% (1.2% ; 8.7%)**	**5.3% (2.3% ; 8.5%)**
	Strain-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	**6.5% (4.1% ; 8.8%)**	**3.8% (0.4% ; 7.2%)**	**7.3% (4.2% ; 10.5%)**
		Frequently	**8.2% (5.5% ; 10.9%)**	**8.1% (3.9% ; 12.6%)**	**4.4% (1.2% ; 7.7%)**
	Family interference with work	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	**3.5% (1.3% ; 5.8%)**	**4.5% (1.0% ; 8.0%)**	2.8% (-0.1% ; 5.8%)
		Frequently	-1.7% (-5.4% ; 2.2%)	-1.8% (-7.3% ; 3.9%)	-0.8% (-5.7% ; 4.4%)
	Lack of time for personal care and leisure	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	**7.6% (5.2% ; 10.1%)**	**5.8% (2.3% ; 9.4%)**	**6.6% (3.4% ; 10.0%)**
		Frequently	**8.3% (5.8% ; 10.9%)**	**7.2% (3.4% ; 11.2%)**	**4.6% (1.5% ; 7.9%)**
Lifestyle ideal CVH score	Time-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	**2.5% (0.2% ; 5.0%)**	2.3% (-1.0% ; 5.8%)	2.7% (-0.6% ; 6.2%)
		Frequently	**3.1% (0.7% ; 5.6%)**	2.9% (-0.6% ; 6.6%)	**3.4% (0.1% ; 6.7%)**
	Strain-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	**3.1% (0.8% ; 5.4%)**	2.8% (-0.4% ; 6.2%)	**3.3% (0.1% ; 6.6%)**
		Frequently	1.8% (-0.8% ; 4.4%)	**4.5% (0.4% ; 8.7%)**	0.1% (-3.2% ; 3.5%)
	Family interference with work	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	1.3% (-1.0% ; 3.6%)	2.7% (-0.6% ; 6.1%)	0.0% (-3.0% ; 3.1%)
		Frequently	**-6.2% (-9.8% ; -2.4%)**	-3.2% (-8.4% ; 2.4%)	**-9.1% (-14.1% ; -3.8%)**
	Lack of time for personal care and leisure	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	**4.6% (2.2% ; 7.0%)**	**4.7% (1.3% ; 8.1%)**	**4.3% (1.0% ; 7.8%)**
		Frequently	-0.6% (-3.0% ; 1.8%)	1.3% (-2.3% ; 5.0%)	-2.0% (-5.2% ; 1.3%)
Health ideal CVH score	Time-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	**5.1% (1.2% ; 9.2%)**	6.4% (0.0% ; 13.1%)	**5.9% (1.0% ; 10.9%)**
		Frequently	**10.5% (6.4% ; 14.8%)**	**8.2% (1.4% ; 15.5%)**	**7.7% (3.0% ; 12.6%)**
	Strain-based work interference with family	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	**11.3% (7.3% ; 15.5%)**	5.4% (-0.7% ; 11.9%)	**12.1% (7.3% ; 17.3%)**
		Frequently	**17.4% (12.8% ; 22.3%)**	**14.6% (6.6% ; 23.1%)**	**9.6% (4.5% ; 14.8%)**
	Family interference with work	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	**6.6% (2.8% ; 10.5%)**	**7.5% (1.2% ; 14.1%)**	**6.1% (1.6% ; 10.8%)**
		Frequently	4.6% (-1.7% ; 11.3%)	0.4% (-9.3% ; 11.3%)	**9.0% (1.2% ; 17.4%)**
	Lack of time for personal care and leisure	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
		Sometimes	**12.1% (7.9% ; 16.5%)**	**7.7% (1.3% ; 14.6%)**	**9.4% (4.3% ; 14.7%)**
		Frequently	**21.7% (17.1% ; 26.4%)**	**17.9% (10.5% ; 25.9%)**	**12.8% (7.6% ; 18.1%)**

CVH: Cardiovascular health. All models are adjusted for age, sex, race, educational level, income and study site. p<0.05 are in bold.

Table S2. Crude prevalence ratios (95% confidence intervals) for the association between work-family conflict and ideal CVH metrics.

	Work-family conflict domains and frequency		Diet	Physical activity	Body-mass index	Smoking	Blood pressure	Glucose	Total cholesterol
All sample	Time-based work interference with family	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.15 (0.75 - 1.78)	1.05 (0.98 - 1.13)	1.02 (0.97 - 1.08)	1.02 (0.997 - 1.04)	**1.10 (1.05 - 1.16)**	1.00 (0.93 - 1.07)	1.04 (0.98 - 1.11)
		Frequently	1.35 (0.89 - 2.05)	1.00 (0.92 - 1.08)	1.02 (0.97 - 1.08)	**1.04 (1.02 - 1.06)**	**1.16 (1.11 - 1.22)**	**1.09 (1.02 - 1.16)**	1.05 (0.99 - 1.12)
	Strain-based work interference with family	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.12 (0.75 - 1.68)	1.00 (0.93 - 1.08)	**1.07 (1.02 - 1.13)**	**1.02 (1.001 - 1.04)**	**1.16 (1.10 - 1.21)**	**1.11 (1.04 - 1.18)**	**1.06 (1.001 - 1.13)**
		Frequently	1.15 (0.73 - 1.80)	**0.91 (0.83 - 0.99)**	1.05 (0.99 - 1.12)	**1.04 (1.02 - 1.06)**	**1.23 (1.17 - 1.30)**	**1.20 (1.12 - 1.29)**	**1.08 (1.01 - 1.15)**
	Family interference with work	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.08 (0.72 - 1.60)	1.06 (0.99 - 1.14)	1.01 (0.96 - 1.07)	1.00 (0.98 - 1.01)	**1.07 (1.02 - 1.12)**	**1.09 (1.03 - 1.16)**	1.04 (0.98 - 1.10)
		Frequently	0.93 (0.45 - 1.91)	**0.75 (0.65 - 0.87)**	1.01 (0.92 - 1.11)	**0.96 (0.93 – 0.996)**	1.03 (0.95 - 1.12)	1.06 (0.95 - 1.18)	1.05 (0.95 - 1.16)
	Lack of time for personal care and leisure	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.06 (0.70 - 1.62)	1.06 (0.99 - 1.14)	**1.11 (1.05 - 1.17)**	1.01 (0.99 - 1.03)	**1.16 (1.10 - 1.22)**	**1.20 (1.12 - 1.28)**	1.01 (0.95 - 1.08)
		Frequently	1.12 (0.73 - 1.72)	**0.75 (0.69 - 0.81)**	**1.06 (1.004 - 1.13)**	**1.04 (1.02 - 1.06)**	**1.33 (1.26 - 1.39)**	**1.27 (1.18 - 1.36)**	1.05 (0.98 - 1.12)
Men	Time-based work interference with family	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	0.85 (0.41 - 1.76)	1.08 (0.99 - 1.19)	0.97 (0.89 - 1.05)	1.03 (0.999 - 1.06)	**1.15 (1.06 - 1.26)**	0.94 (0.83 - 1.07)	1.05 (0.97 - 1.15)
		Frequently	1.15 (0.56 - 2.33)	1.06 (0.96 - 1.17)	0.96 (0.87 - 1.05)	**1.05 (1.02 - 1.08)**	**1.15 (1.05 - 1.26)**	1.05 (0.92 - 1.20)	1.04 (0.95 - 1.14)
		Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)

	Strain-based work interference with family	Sometimes	1.47 (0.78 - 2.78)	1.06 (0.97 - 1.16)	1.01 (0.93 - 1.09)	1.02 (0.996 - 1.05)	**1.14 (1.05 - 1.25)**	0.97 (0.86 - 1.10)	1.02 (0.94 - 1.11)
		Frequently	0.81 (0.30 - 2.13)	1.07 (0.96 - 1.20)	1.03 (0.93 - 1.14)	**1.04 (1.01 - 1.08)**	**1.19 (1.07 - 1.32)**	**1.21 (1.05 - 1.39)**	1.07 (0.96 - 1.18)
	Family interference with work	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.52 (0.81 - 2.85)	1.09 (0.999- 1.19)	1.04 (0.96 - 1.13)	0.99 (0.97 - 1.02)	**1.10 (1.01 - 1.20)**	**1.14 (1.01 - 1.28)**	1.02 (0.93 - 1.11)
		Frequently	0.70 (0.17 - 2.95)	0.84 (0.71 - 1.004)	1.09 (0.96 - 1.25)	0.96 (0.92 - 1.02)	0.96 (0.82 - 1.12)	1.11 (0.90 - 1.35)	0.99 (0.86 - 1.15)
	Lack of time for personal care and leisure	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.46 (0.71 - 3.02)	1.17 (1.07 - 1.27)	1.02 (0.94 - 1.11)	1.01 (0.98 - 1.04)	**1.10 (1.0004 - 1.20)**	**1.15 (1.02 - 1.31)**	1.02 (0.94 - 1.11)
		Frequently	1.85 (0.88 - 3.86)	**0.86 (0.77 - 0.97)**	1.02 (0.93 - 1.12)	**1.06 (1.03 - 1.09)**	**1.29 (1.18 - 1.42)**	**1.29 (1.13 - 1.48)**	1.02 (0.92 - 1.12)
Women	Time-based work interference with family	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	1.40 (0.81 - 2.39)	0.99 (0.87 - 1.11)	1.08 (1.003 - 1.16)	1.01 (0.98 - 1.03)	**1.09 (1.03 - 1.15)**	1.05 (0.97 - 1.13)	1.02 (0.94 - 1.12)
		Frequently	1.42 (0.84 - 2.39)	0.98 (0.87 - 1.10)	1.06 (0.98 - 1.14)	**1.03 (1.01 - 1.06)**	**1.12 (1.06 - 1.18)**	1.04 (0.97 - 1.12)	1.06 (0.97 - 1.15)
	Strain-based work interference with family	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	0.91 (0.54 - 1.54)	0.96 (0.86 - 1.08)	**1.12 (1.04 - 1.20)**	1.01 (0.99 - 1.04)	**1.13 (1.07 - 1.19)**	**1.12 (1.05 - 1.21)**	**1.11 (1.02 - 1.20)**
		Frequently	1.11 (0.66 - 1.87)	**0.86 (0.76 - 0.98)**	1.03 (0.95 - 1.11)	1.02 (0.996 - 1.05)	**1.13 (1.07 - 1.20)**	1.05 (0.97 - 1.14)	**1.09 (1.001 - 1.19)**
	Family interference with work	Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
		Sometimes	0.88 (0.52 - 1.47)	1.03 (0.92 - 1.15)	1.00 (0.93 - 1.07)	1.00 (0.97 - 1.02)	1.05 (0.999 - 1.11)	**1.07 (1.002 - 1.15)**	1.06 (0.97 - 1.15)
		Frequently	1.06 (0.46 - 2.44)	**0.61 (0.47 - 0.79)**	0.95 (0.83 - 1.08)	0.96 (0.92 - 1.01)	**1.10 (1.004 - 1.20)**	1.06 (0.94 - 1.20)	1.12 (0.98 - 1.28)
		Never to rarely	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)

| | Lack of time for personal care and leisure | Sometimes | 0.83 (0.50 - 1.39) | 0.98 (0.87 - 1.10) | **1.16 (1.07 - 1.25)** | 1.01 (0.99 - 1.04) | **1.13 (1.07 - 1.20)** | **1.12 (1.04 - 1.21**) | 1.01 (0.92 - 1.10) |
| | | Frequently | 0.76 (0.45 - 1.29) | **0.71 (0.63 - 0.81)** | 1.06 (0.98 - 1.14) | 1.02 (0.995 - 1.05) | **1.20 (1.14 - 1.28)** | 1.08 (0.998 - 1.16) | 1.07 (0.99 - 1.17) |

CVH: Cardiovascular health. All models are adjusted for age, sex, race, educational level, income and study site. p<0.05 are in bold font.

Table S3. Adjusted relative predicted scores differences (95% confidence intervals) for the association between lifestyle ideal CVH scores and family interference with work and lack of time for personal care and leisure domains, stratified by the nature of occupation.

	Manual work			
	Work-family conflict domains and frequency	All sample	Men	Women
Family interference with work	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	-1.3% (-7.5% to 5.2%)	-1.7% (-8.9% to 5.9%)	0.5% (-11.2% to 13.6%)
	Frequently	0.9% (-7.0% to 9.5%)	4.5% (-4.9% to 14.9%)	-10.9% (-24.6% to 5.3%)
Lack of time for personal care and leisure	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	-1.4% (-6.8% to 4.2%)	-0.5% (-6.9% to 6.3%)	-4.3% (-14.1% to 6.7%)
	Frequently	0.7% (-6.2% to 8.0%)	1.1% (-7.2% to 10.2%)	0.2% (-11.7% to 13.7%)
	Routine non-manual work			
	Work-family conflict domains and frequency	All sample	Men	Women
Family interference with work	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	-2.0% (-6.1% to 2.3%)	0.6% (-6.9% to 8.7%)	-2.9% (-7.8% to 2.3%)
	Frequently	-5.3% (-12.4% to 2.3%)	-2.9% (-15.0% to 10.9%)	-6.7% (-15.1% to 2.6%)
Lack of time for personal care and leisure	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	-0.1% (-4.3% to 4.3%)	1.0% (-6.1% to 8.7%)	-0.7% (-5.8% to 4.7%)
	Frequently	**-10.1% (-14.2% to -5.8%)**	-5.3% (-13.4% to 3.5%)	**-11.5% (-16.2% to -6.5%)**
	Non-routine non-manual work			
	Work-family conflict domains and frequency	All sample	Men	Women
Family interference with work	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	-1.7% (-4.4% to 1.1%)	-1.2% (-5.2% to 3.0%)	-2.2% (-5.9% to 1.7%)
	Frequently	**-7.7% (-12.6% to -2.5%)**	-6.1% (-13.4% to 1.8%)	**-9.3% (-15.8% to -2.3%)**
Lack of time for personal care and leisure	Never to rarely	0 (Reference)	0 (Reference)	0 (Reference)
	Sometimes	-1.4% (-4.4% to 1.8%)	-0.4% (-4.7% to 4.2%)	-2.5% (-6.7% to 1.9%)
	Frequently	**-9.1% (-11.9% to -6.1%)**	**-7.8% (-12.0% to -3.3%)**	**-10.4% (-14.2% to -6.4%)**

Note: Left vertical label reads "Lifestyle ideal CVH score"

CVH: Cardiovascular health.