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Physical and mental health factors associated with work engagement among Finnish female municipal employees: a cross-sectional study

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ABSTRACT

Objectives Work engagement is related to mental health, but studies of physical health's association with work engagement are scarce. This study aims to evaluate the relationship between physical health, psychosocial risk factors and work engagement among Finnish women in municipal work units.

Methods A cross-sectional study was conducted in 2014 among 726 female employees from 10 municipal work units of the city of Pori, Finland. Work engagement was assessed with the nine-item Utrecht Work Engagement Scale. The American Heart Association's concept of ideal cardiovascular health (CVH) was used to define physical health (non-smoking, body mass index <25.0 kg/m^2, physical activity at goal, healthy diet, total cholesterol <5.18mmol/L, blood pressure <120/80 mm Hg, normal glucose tolerance). Psychosocial risk factors (social isolation, stress, depressive symptoms, anxiety, hostility and type D personality) were included as core questions suggested by 2012 European Guidelines on cardiovascular disease prevention.

Results Of the study subjects, 25.2% had favourable 5–7 CVH metrics. The sum of CVH metrics, healthy diet and physical activity at goal were positively associated with work engagement. In subjects without psychosocial risk factors (36.7%), work engagement was high and stable. Presence of even one psychosocial risk factor was associated with a lower level of work engagement regardless of the sum of ideal CVH metrics.

Conclusions Both physical and mental health factors have a positive relationship with work engagement, whereas the presence of even one psychosocial risk factor has a negative association regardless of the level of classic cardiovascular risk factors.

Strengths and limitations of this study

- Anthropological measurements were made by trained medical staff and the laboratory tests performed were up-to-date.
- Several aspects of life both at work and in leisure time could be taken into account in many of the occupational groups.
- Any causality cannot be determined due to the cross-sectional nature of our study.
- The exact participation rate for the study is impossible to estimate, because we cannot know how many of the employees actually received or read the invitation email.

INTRODUCTION

Cardiovascular disease (CVD) is a major health burden explaining 50% of all causes of death in the global working population,[1] thus leading to a reduction in work ability and premature workforce loss.[2] Unfortunately, in women, coronary event rates have not decreased during the last two decades[3–7] and women-focused nuances are needed in the prevention of CVD.

The American Heart Association (AHA) has created a concept of ideal cardiovascular health (CVH), which aims to reduce CVD mortality and improve cardiovascular risk factors in the US population by 20% by 2020.[8] Ideal CVH is defined as the simultaneous presence of favourable health behaviours (non-smoking, ideal body mass index, physical activity at goal, healthy diet) and health factors at an ideal level (total cholesterol, blood pressure, fasting plasma glucose).[8]

Psychosocial factors also have the potential to affect the onset or progression of CVD. European Guidelines on CVD prevention in clinical practice emphasise that low socio-economic status, lack of social support, stress at work and in family life, depression, anxiety, hostility and a type D personality can act as barriers to treatment adherence and efforts to improve lifestyle, as well as deterring the promotion of health and well-being in patients and populations.[9]

Although work plays a prominent role in our lives, studies of the health-enhancing potential of work engagement are scarce. Work engagement is a positive psychological construct, which is defined as 'a positive, fulfilling, work-related state of mind that is

characterised by vigour, dedication and absorption'.[10] Work engagement is positively related to perceived health status[11] and negatively with psychological distress, physical complaints[12–14] and depressive symptoms.[15–18]

Identifying factors influencing work engagement and enhancing a healthy lifestyle is a wishful strategy for prevention of CVD. This study aims to assess cardiovascular health, psychosocial factors and work engagement among female employees in municipal work units. We hypothesise that cardioprotective factors have a positive relationship with work engagement. More specifically, we hypothesised that the individual and the sum of CVH metrics would associate with work engagement. Furthermore, we wanted to examine whether the presence of psychosocial risk factors would affect work engagement evaluated across the categories of CVH metrics.

MATERIALS AND METHODS

Participants and study design

PORTAAT (PORi To Aid Against Threats) is a longitudinal study conducted among employees of the city of Pori (83 497 inhabitants in 2014) in South-Western Finland. The study population comprised workers from 10 work units, which were selected by the chief of the municipal welfare unit of Pori. The main selection criterion was that the work unit had not been involved in any other health promoting programme than routine occupational healthcare during the past 10 years. An invitation and study information letters were sent to the employees as an email attachment by the managers of the work units. Information events were also organised for employees. There were no exclusion criteria. Altogether, 836 employees (104 men, 732 women) consented to participate in the PORTAAT study. For this cross-sectional paper, we analysed the data of 726 female employees working in libraries (n=22), museums (n=33), technical management (n=80), social services (=195) and healthcare units (n=396) who had completed the work engagement questionnaire.

MEASURES

Work-related measures

Work engagement was measured with the nine-item Utrecht Work Engagement Scale (UWES-9).[19] UWES-9 consists of three subscales, vigour, dedication and absorption, which were scored on a 7-point Likert scale ranging from 0 (never) to 6 (daily). The mean subscale score was computed by adding the scores on the particular scale and dividing the sum by the number of items in the subscale involved. A similar procedure was followed for the total score. The higher each item was rated, the higher the overall work engagement. The Finnish values for total work engagement are <1.44 (very low), 1.44–3.43 (low), 3.44–4.53 (moderate), 4.54–5.30 (high) and 5.31–6.00 (very high).[20]

We assessed the worker's ability to participate in work with the question 'what is your current work ability compared with your lifetime best?'. This first item of the widely used Work Ability Index[21] is named Work Ability Score (WAS) and has a 0–10 response scale, where 0 represents 'completely unable to work' and 10 'work ability at its best'. Similar reference values for WAS were used for the Work Ability Index: poor (0–5 points), moderate (6-7 points), good (8-9 points), excellent (10 points).[22]

Questions were asked as regards occupational status, working hours per week and the role of shift work in current work using a self-administrated questionnaires. The participants' financial situation was assessed with the question 'I have to spare expenditures' (yes or no).

Ideal cardiovascular health metrics

Smoking status was assessed by the questionnaire. Non-smoking was defined as having never smoked or having quit smoking >12 months ago.

Height and weight were measured by a study nurse with the subjects in a standing position without shoes and outer garments. Weight was measured to the nearest 0.1 kg with calibrated scales and height to the nearest 0.5 cm with a wall-mounted stadiometer. Body mass index (BMI) was calculated as weight (kg) divided by the square of height (m^2). The ideal BMI was <25.0 kg/m^2.

Physical activity was assessed using a questionnaire that asked the frequency and duration of leisure-time physical activity and commuting activities in a typical week. Ideal physical activity was defined as engaging in ≥150 min per week of moderately intense activities or ≥75 min per week of vigorously intense activities or ≥150 min per week of moderately+vigorously intense activities.[8]

Information concerning diet was collected with a food-frequency questionnaire. Daily consumption of fruits, vegetables, whole grains, unsaturated dietary fats and white meat (poultry, fish) at least three times a week were considered to be a healthy diet. Intake of the ideal level of each dietary component was scored with 1 point, from a range of 0–5. The dietary CVH metric was categorised as ideal, if a dietary score of 4–5 was achieved.[8]

Blood pressure was measured by a study nurse with an automatic validated blood pressure monitor with subjects in a sitting posture, after resting for at least 5 min. Two readings, taken at intervals of at least 2 min, were measured, and the mean used in the analysis. The ideal level was an untreated blood pressure of <120 mm Hg systolic and <80 mm Hg diastolic.

Laboratory tests were determined in blood samples which were obtained after at least 8 hours of fasting. Total cholesterol was measured enzymatically (Architect c4000/c8000). The ideal level was an untreated total cholesterol <5.18 mmol/L. Glucose tolerance was measured with glycated haemoglobin (HbA1c) which was analysed using high-performance liquid chromatography method (Tosoh HLC-723G7 (G7)). The AHA metric uses fasting plasma glucose (<5.55 mmol/L) to determine normoglycaemia; however, we used HbA1c because of its property of giving an indication of glycaemia over

several preceding weeks rather than at a single time point.[23] Normoglycaemia was defined as HbA1c <6.0% (<42 mmol/mol).[24]

The seven ideal CVH metrics were grouped into three categories: unfavourable (0–2 ideal CVH metrics), intermediate (3-4 ideal CVH metrics) and favourable (5-7 ideal CVH metrics) level of cardiovascular health.[25]

Psychosocial risk factors

At the clinic, the study nurse assessed the psychosocial risk factors by asking core questions suggested by the European 2012 guidelines on CVD prevention in clinical practice[9]:

- Work and family stress: Do you have enough control over how to meet the demands at work? Is your reward appropriate for your effort? Do you have serious problems with your spouse?
- Social isolation: Are you living alone? Do you lack a close confidant?
- Depression: Do you feel down, depressed and hopeless? Have you lost interest and pleasure in life?
- Anxiety: Do you frequently feel nervous, anxious or on edge? Are you frequently unable to stop or control worrying?
- Hostility: Do you frequently feel angry over little things? Do you often feel annoyed about the habits other people have?
- Type D personality: In general, do you often feel anxious, irritable or depressed? Do you avoid sharing your thoughts and feelings with other people?

Low job demand–control, low effort–reward imbalance and/or a 'yes' answer to one or more items was an indication of a likely psychosocial risk factor.

Other measures

With self-administrated questionnaires and medical records, information was gathered about diseases diagnosed by a physician, years of education, marital status (cohabiting or not) and quality of sleep (good or not good). Alcohol consumption was assessed with the three-item Alcohol Use Disorders Identification Test with a cut-off of 5 for harmful drinking.[26]

Informed consent

The study protocol and consent forms were reviewed and approved by the Ethics Committee of the Hospital District of Southwest Finland. All participants signed a written informed consent for the project and subsequent medical research.

Statistical analysis

Statistical significances for the unadjusted hypothesis of linearity across categories of total work engagement and CVH metrics were evaluated by using the Cochran-Armitage test for trend and analysis of variance with an appropriate contrast. Adjusted hypothesis of linearity (orthogonal polynomial) were evaluated using generalised linear models (eg, analysis of covariance and logistic models) with appropriate distribution and link function. Models included age and years of education as covariates. In the case of violation of the assumptions (eg, non-normality), a bootstrap-type method was used (10 000 replications) to estimate the SE. Multivariate linear regression analysis was used to identify the appropriate predictors of continuous work engagement using standardised regression coefficient Beta (β). The Beta value is a measure of how strongly each predictor variable influences the criterion (dependent) variable. The Beta is measured in units of SD. Cohen's standard for Beta values above 0.10, 0.30 and 0.50 represents small, moderate and large relationships, respectively.[27] The normality of variables was evaluated by the Shapiro-Wilk W-test. All analyses were performed using STATA 14.1.

The Strengthening The Reporting of OBservational Studies in Epidemiology (STROBE) Guidelines were followed in this paper.

RESULTS

We evaluated 726 female employees (mean age 48±10 years). Table 1 shows a general overview of the characteristics of the study subjects.

Of the employees, 25.2% had 5–7 CVH metrics, 53.0% had 3–4 metrics and 21.8% had 0–2 metrics at the ideal level. The sum of ideal CVH metrics were associated linearly with work engagement driven by the positive relationship of healthy diet and physical activity with work engagement. Financial situation, good quality of sleep and WAS were associated positively with work engagement (table 2).

At least one psychosocial risk factor was reported by 63.3% of the female employees. The prevalence of psychosocial risk factors were as follows: depressive symptoms 18.9%, anxiety 31.4%, hostility 20.9%, type D personality 26.3%, social isolation 17.5% and stress 31.0%. The prevalence of any psychosocial risk factor decreased linearly with work engagement (table 2).

In the multivariate linear regression analysis, WAS had a strong positive relationship with work engagement while age, financial situation and total cholesterol level had a small positive association. BMI, depressive symptoms, hostility and stress had a small negative influence on work engagement (figure 1).

Figure 2 shows that in subjects without psychosocial risk factors, total work engagement was high and stable (p value for linearity 0.14) across the range of the sum of ideal CVH metrics. The presence of even one psychosocial risk factor had a negative relationship with work engagement. Linearity between the presence of at least one psychosocial risk factor and work engagement was significant (p<0.001) across the categories of the sum of ideal CVH metrics. The interaction between the presence of psychosocial risk factors and the sum of ideal CVH metrics was not significant (p=0.79).

DISCUSSION

According to our study, physical health is positively associated with work well-being driven by the positive

Table 1 A general overview of the characteristics of the study subjects

Variables	
Age, mean (SD)	48.0 (9.9)
Education years, mean (SD)	13.9 (2.7)
AUDIT-C, mean (SD)	2.9 (1.7)
Height (cm), mean (SD)	165.1 (5.9)
Weight (kg), mean (SD)	72.8 (14.1)
Sum of the total seven ideal CVH metrics, mean (SD)	3.6 (1.3)
Non-smoking, n (%)	635 (87.5)
Body mass index (kg/ m^2), mean (SD)	26.7 (4.8)
Healthy diet, n (%)	258 (35.5)
Physical activity at goal, n (%)	290 (39.9)
Blood pressure systolic (mm Hg), mean (SD)	131.3 (17.0)
Blood pressure diastolic (mm Hg), mean (SD)	85.7 (10.5)
Total cholesterol (mmol/L), mean (SD)	5.3 (0.9)
HbA1c (mmol/mol), mean (SD)	5.5 (0.5)
Sum of the total six psychosocial risk factors, mean (SD)	1.5 (1.5)
Work ability score, (NRS), mean (SD)	8.2 (8.2)
Work engagement, mean (SD)	
Total	4.8 (0.9)
Vigour	4.8 (1.0)
Dedication	4.9 (1.0)
Absorption	4.7 (1.1)

AUDIT-C, Alcohol Use Disorders Identification Test; CVH,cardiovascular health; HbA1c, glycated haemoglobin;NRS, numeric rating scale.

relationship of a healthy diet and physical activity with work engagement. However, even one of the measured psychosocial risk factors had a negative association with the level of work engagement regardless of the sum of ideal CVH metrics.

Our finding that psychosocial risk factors have a negative relationship with work engagement is in line with previous studies reporting that employees with a high level of work engagement have lower scores on stress, anxiety and depression.[12 14–17 28] Vigour especially characterised by energy, mental resilience, the willingness to invest one's effort and persistence[10] was linked to decreased depression and anxiety in a 2-year follow-up study.[18] Due to technological developments, the nature of work in developed countries has become less physical but more demanding mentally and emotionally, as work pace and stress have increased.[29] These changes in daily working life may contribute to adverse health effects, including mental health problems and body weight gain.[29] However, work can also contribute in a positive way to mental health providing psychological development, social contacts, a purpose in life and an increase in self-esteem and quality of life[29] as seen in the study where work engagement increased life satisfaction.[17]

Compared with Finnish reference values,[20] work engagement in our subjects was high and stable. Every fourth of our study subjects had 5–7 ideal CVH metrics, which is comparable to the USA.[30] Willis *et al* have estimated that individuals in midlife with 5–7 ideal CVH metrics exhibited 25% lower median annual non-CVD costs and 75% lower median CVD costs in old age than those with 0–2 ideal CVH metrics.[25] Leijten *et al* have shown that work engagement is related to better physical health,[31] which is in line with our finding of a positive relationship between the sum of ideal CVH metrics and work engagement. However, it is unclear which lifestyle-related efforts could increase work engagement. Enhancing physical activity and fruit intake did not improve work engagement in a work place health promotion programme,[32] even though these were the ideal CVH metrics associated with work engagement in the present study. Our finding of an association with quality of sleep and work engagement has also been established by Hallberg *et al*,[15] who showed that poor sleep hygiene decreases work engagement, highlighting that work engagement has a strong health component. Even though physical health is rarely studied with work engagement, psychological studies have shown many potential factors that increase work engagement, such as social support, innovativeness, appreciation[33] and job control.[34]

In our study subjects, WAS was strongly associated with higher work engagement (7.2 vs 8.8). This supports previous studies showing that work engagement has a positive influence on work ability.[35–37] For example, Airila *et al*[36] showed that baseline work ability predicted work ability after a 10-year follow-up directly and indirectly via work engagement. They also demonstrated that better job resources (supervisory relations, interpersonal relations, task resources) and self-esteem were related to increased work engagement and work ability. Work ability is the degree to which a worker, given his/her health, is physically and mentally able to cope with the demands at work.[38] Work engagement is more dependent on mental aspects, whereas work ability also involves the subject's physical condition. Our result still has to be interpreted with caution because the relationship can also be bidirectional.

At an organisational level, occupational healthcare should actively seek for psychosocial risk factors, but also focus on enhancing a healthy lifestyle, that is, factors proven to have a positive relationship with work engagement. To increase work engagement at an individual level, it seems that the simplest rule is to eat healthy, exercise at a moderate-to-vigorous level, focus on social life and embrace positive attitude. Future studies should focus on individual physical health metrics (eg, physical activity, blood pressure) evaluated as metric variables, since in this study, the ideal CVH metrics are dichotomous variables with strict goals and this can potentially explain the

Table 2 Characteristics of the study subjects according to the sum of work engagement

Variables	Total work engagement				p Value*	
	Low (≤3.43) n=59	Moderate (3.44–4.53) n=151	High (4.54–5.30) n=276	Very high (>5.30) n=240	Crude	Adjusted†
Age, mean (SD)	47 (11)	48 (9)	47 (10)	49 (9)	0.53	
Education years, mean (SD)	14.0 (2.5)	14.0 (2.6)	14.0 (2.7)	13.7 (2.8)	0.28	
Financial situation, n (%)	27 (46)	85 (56)	175 (63)	167 (70)	<0.001	<0.001
Marital status, cohabiting, n (%)	43 (73)	111 (74)	231 (84)	180 (75)	0.59	0.55
Good quality of sleep, n (%)	36 (61)	103 (68)	196 (71)	181 (75)	0.019	0.016
AUDIT-C, mean (SD)	2.9 (2.0)	2.9 (1.7)	3.1 (1.6)	2.7 (1.8)	0.55	0.59
Working hours, hours/week, mean (SD)	41.1 (4.0)	41.2 (3.6)	41.4 (3.9)	41.9 (4.2)	0.12	0.16
Shift work, n (%)	20 (34)	55 (36)	85 (31)	71 (30)	0.20	0.12
WAS, (NRS), mean (SD)	7.2 (1.7)	7.6 (1.4)	8.2 (1.0)	8.8 (0.9)	<0.001	<0.001
Sum of ideal cardiovascular health metrics, n (%)					0.076	0.023
Unfavourable (0–2)	11 (19)	39 (26)	59 (21)	49 (20)		
Intermediate (3-4)	37 (63)	80 (53)	148 (54)	120 (50)		
Favourable (5-7)	11 (19)	32 (21)	69 (25)	71 (30)		
Ideal cardiovascular health metrics, n (%)						
Non-smoking	48 (82)	142 (94)	237 (86)	208 (87)	0.58	0.34
Body mass index <25.0 kg/m^2	30 (51)	63 (42)	117 (42)	87 (36)	0.050	0.070
Physical activity at goal	21 (36)	48 (32)	110 (40)	111 (46)	0.008	0.006
Healthy diet	16 (27)	45 (30)	90 (33)	107 (45)	<0.001	0.001
Untreated blood pressure <120/80 mm Hg	12 (20)	23 (15)	52 (19)	50 (21)	0.39	0.22
Untreated total cholesterol <5.18 mmol/L	26 (44)	61 (40)	121 (44)	111 (46)	0.39	0.23
Untreated HbA1c <6.0% (42 mmol/mol)	54 (92)	139 (92)	263 (95)	215 (90)	0.43	0.58
Any psychosocial risk factor, n (%)	50 (85)	107 (71)	169 (61)	134 (56)	<0.001	<0.001
Depressive symptoms	25 (42)	38 (25)	46 (17)	28 (12)	<0.001	<0.001
Anxiety	31 (53)	57 (38)	83 (30)	57 (24)	<0.001	<0.001
Hostility	23 (39)	34 (23)	57 (21)	38 (16)	<0.001	<0.001
Type D personality	30 (51)	48 (32)	67 (24)	46 (19)	<0.001	<0.001
Social isolation	15 (25)	35 (23)	36 (13)	41 (17)	0.047	0.049
Stress	32 (54)	56 (37)	85 (31)	52 (22)	<0.001	<0.001

*p for linearity.
†Adjusted for age and years of education.
AUDIT-C, Alcohol Use Disorders Identification Test; HbA1c, glycated haemoglobin; NRS, numeric rating scale; WAS, work ability score.

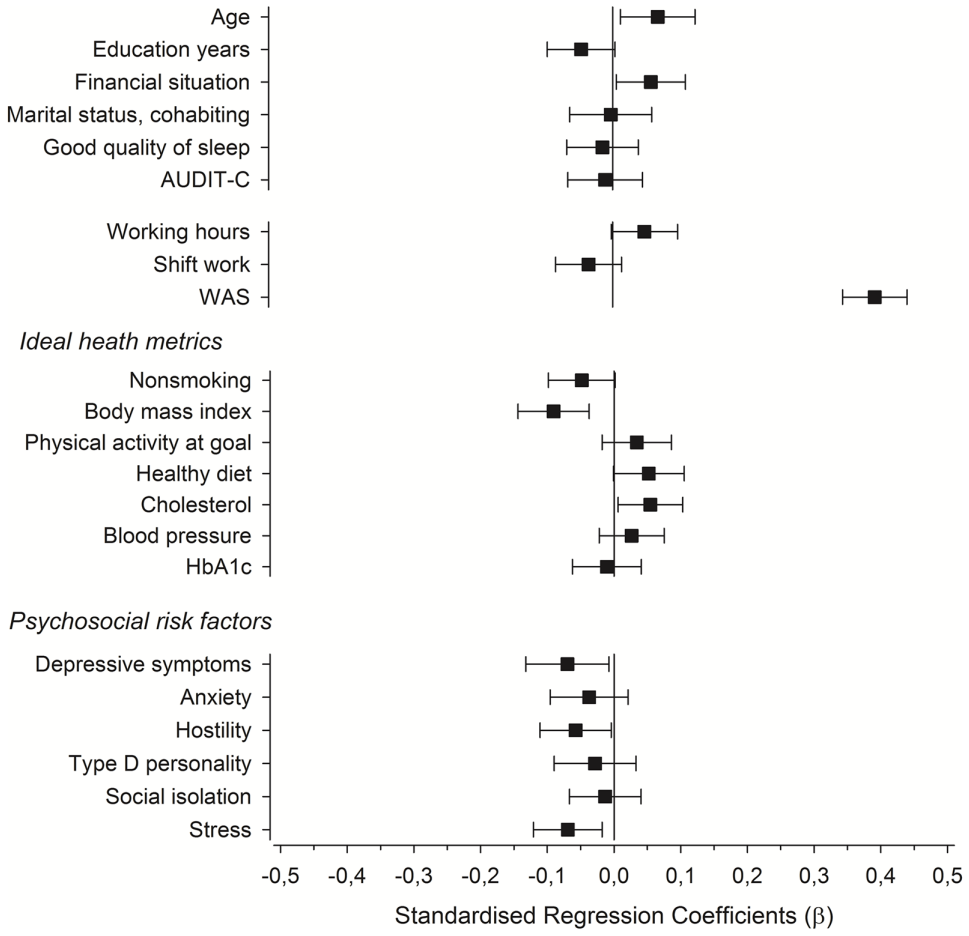

Figure 1 Predictors of continuous work engagement (β-values with 95% CI) using multivariate regression. AUDIT-C, Alcohol Use Disorders Identification Test; HbA1c, glycated haemoglobin; WAS, work ability score.

lack of any associations with work engagement other than those of diet and physical activity. Furthermore, there is a need for longitudinal studies to explore relationships between physical and mental cardioprotective factors with work engagement.

We acknowledge some limitations of the study. The causality of work engagement with psychosocial risk factors or lifestyle factors cannot be determined due to the cross-sectional nature of our study. A common source bias might explain the relationship with work engagement and mental health because the construct of work engagement resembles more a mental health context than the construct of physical health. Diet and physical activity were measured by self-assessment, which may be influenced by social desirability. A possible healthy worker effect[39] can emerge, as subjects out of the workforce were not studied. This may cause bias in the generalisability of the results. In addition, the exact participation rate for the study is impossible to estimate because we cannot know how many of the employees actually received or read the invitation email. To screen for psychosocial risk factors, we used simple core questions.[9] Answering 'yes' to one of these questions does not imply that the person actually has a risk factor; for example, not all people living alone are socially isolated. However, giving an affirmative answer to either one of the two core questions on depression used in the present study has been shown to be as effective as using longer screening instruments.[40] However, the single-item question WAS has a strong association with the Work Ability Index and is trustworthy in evaluating work ability.[41] The strengths of the study are that we could take into account several aspects of life in many occupational groups. Anthropological measures were conducted by trained medical staff, and the laboratory tests performed were up-to-date.

CONCLUSIONS

Our results suggest that both physical and mental cardioprotective factors have a positive relationship with work engagement. However, the presence of even one psychosocial risk factor has potential to associate negatively with work engagement regardless of the sum of ideal CVH metrics. Longitudinal studies are needed to confirm the direction of these associations.

Contributors VV, HK and PK contributed to the conception or design of the work, and to the acquisition, analysis or interpretation of data for the work. VV and PK

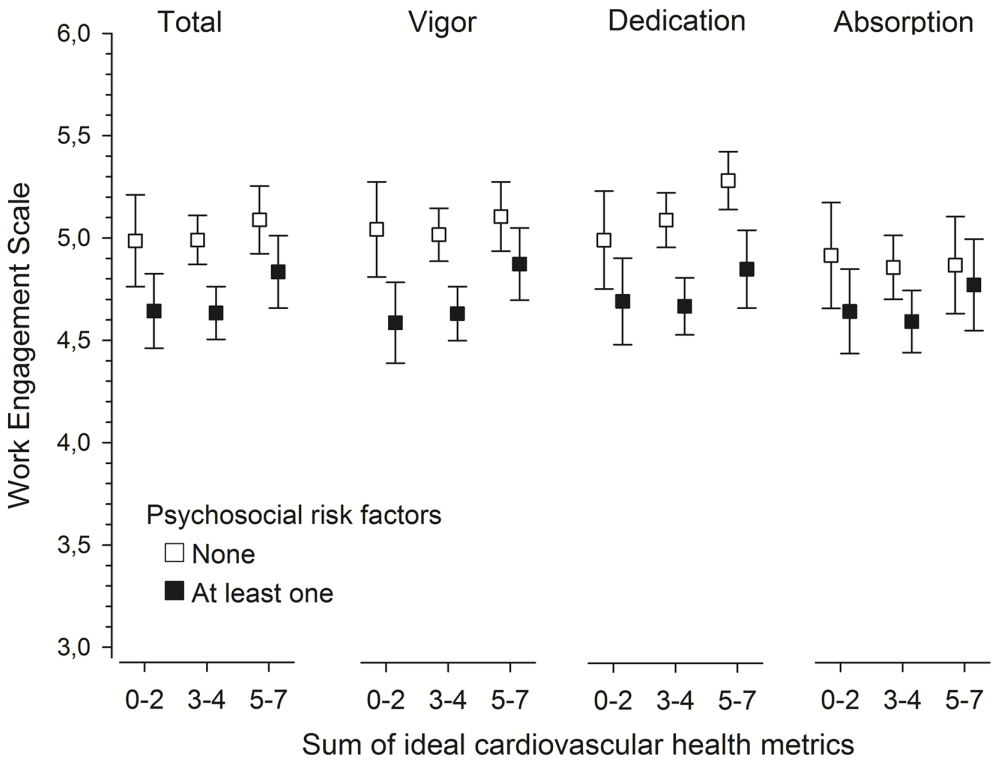

Figure 2 Mean with 95% CI of total work engagement and its subscales (adjusted for age and education years) according to the sum of ideal cardiovascular health metrics and the prevalence of psychosocial risk factors among the female employees.

drafted the manuscript. All authors critically revised the manuscript and gave final approval and agree to be accountable for all aspects of work ensuring integrity and accuracy.

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Competing interests None declared.

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Data sharing statement There are no additional unpublished data from this study. The data can be accessed by Professor Päivi Korhonen (paikor@utu.fi).

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