



UNIVERSITY OF
GLOUCESTERSHIRE

This is a peer-reviewed, post-print (final draft post-refereeing) version of the following published document and is licensed under Creative Commons: Attribution-Noncommercial-No Derivative Works 4.0 license:

Sumner, Rachel C ORCID: 0000-0002-2421-7146, Bennett, Rachel ORCID: 0000-0002-5780-8786, Creaven, Ann-Marie and Gallagher, Stephen (2020) Unemployment, employment precarity, and inflammation. *Brain, Behavior and Immunity*, 83. pp. 303-308. doi:10.1016/j.bbi.2019.10.013

Official URL: <https://doi.org/10.1016/j.bbi.2019.10.013>

DOI: <http://dx.doi.org/10.1016/j.bbi.2019.10.013>

EPrint URI: <https://eprints.glos.ac.uk/id/eprint/7379>

Disclaimer

The University of Gloucestershire has obtained warranties from all depositors as to their title in the material deposited and as to their right to deposit such material.

The University of Gloucestershire makes no representation or warranties of commercial utility, title, or fitness for a particular purpose or any other warranty, express or implied in respect of any material deposited.

The University of Gloucestershire makes no representation that the use of the materials will not infringe any patent, copyright, trademark or other property or proprietary rights.

The University of Gloucestershire accepts no liability for any infringement of intellectual property rights in any material deposited but will remove such material from public view pending investigation in the event of an allegation of any such infringement.

PLEASE SCROLL DOWN FOR TEXT.

Unemployment, employment precarity, and inflammation.

Dr Rachel C. Sumner, School of Natural & Social Sciences, University of Gloucestershire, United Kingdom

Dr Rachel Bennett, School of Natural & Social Sciences, University of Gloucestershire, United Kingdom

Dr Ann-Marie Creaven, Health Research Institute, Department of Psychology, University of Limerick, Republic of Ireland

Prof Stephen Gallagher, Health Research Institute, Department of Psychology, University of Limerick, Republic of Ireland

Corresponding Author:

Dr Rachel Sumner – rsumner@glos.ac.uk

University of Gloucestershire

School of Natural & Social Sciences

Francis Close Hall

Swindon Road

Cheltenham

Gloucestershire

GL50 4AZ

The authors declare no conflict of interest.

Unemployment has been associated with poorer health, but few studies have examined the biological mechanisms that confer these health decrements. Further, no studies to date have examined differences across employment groups to consider whether employment (in whatever means) is preferential in terms of health. The present study utilised secondary data from Understanding Society: The Household Longitudinal Survey during the aftermath of the recent global recession. Two markers of peripheral inflammation: C-reactive protein (CRP) and fibrinogen were assessed across employment groups (unemployed; permanent, temporary, and self-employed), controlling for individual, socio-demographic and health variables to give greater context to our understanding of how employment status influences health. After controlling for relevant confounds, unemployment was associated with higher levels of fibrinogen but not CRP. Subsequent analyses of employment subgroup revealed the temporary employed have similar levels of fibrinogen to the unemployed, and may therefore be at a similar health disadvantage. The findings confirm that unemployment is associated with increases in one marker of peripheral inflammation, but that this health protection is not conferred to those in precarious employment.

Key words: Inflammation; chronic stress; employment; temporary employment; unemployment

Introduction

Unemployment is a chronic stressor associated with physical and psychological morbidity including increased mortality (Roelfs et al., 2011), endocrine dysregulation (Sumner and Gallagher, 2017, Gallagher et al., 2016), cardiovascular disease risk (Dupre et al., 2012), and inflammation (Hughes et al., 2017). Population-level studies have shown increased inflammatory markers associated with cardiovascular disease among the unemployed (Hughes et al., 2015, Janicki-Deverts et al., 2008, Hintikka et al., 2009). These studies, however, have focused on examining differences in a binary categorisation of employment versus unemployment, but evidence is emerging that as much as “unemployment” is not one single conceptualisation, neither is “employment”.

Atypical employment has grown in recent decades, with many workers employed on fixed-term contracts and experiencing unstable job conditions (Pirani and Salvini, 2015), associated with negative psychological consequences (Gustafsson et al., 2012). Since the recent global recession, both unemployment and temporary employment have expanded. The European Union has a higher temporary employment rate than the OECD average (14.2% versus 11.2% in 2016); and whilst the UK has tracked below this figure (6% in 2017, 4% in 2019), temporary employment has increased since the collapse in 2008 (OECD, 2019). The rate of young people in the UK going into precarious employment (temporary employment) is increasing, resulting in decreases to wellbeing and increases in mental health distress (Thorley and Cook, 2017). If temporary employment is also associated with decrements to health, and increased risk for mortality (Kivimäki et al., 2003) then earlier work using this binary categorisation of unemployment versus employment does not capture the complexities of (un)employment. Further, whilst less abundant, research has suggested that self-employment can be characterised by increased stress and loneliness (Patzelt and Shepherd, 2011), variables associated with health and wellbeing. Our aim was to examine the relationship between unemployment, employment and its subgroups, and inflammation in the UK using national data obtained during a time of peak unemployment (2010-2011), contrasting to similar pre-recession

large scale data (Janicki-Deverts et al., 2008, Hintikka et al., 2009), and extending similar work carried out across economic changes (Hughes et al., 2015).

Methods

Data were obtained from the second wave of *Understanding Society* (University of Essex et al., 2015). Socio-demographic information was obtained at a general survey interview conducted in 2010 or 2011, and blood samples were collected during a nurse visit approximately five months after the survey interview (McFall et al., 2014, University of Essex and Institute for Social and Economic Research, 2014). Respondents were invited to take part in the nurse data collection if they were aged over 16 years, lived in England, Wales, or Scotland, and were not pregnant. Respondents were included in the analyses if they had complete data for the variables of interest. We excluded participants that indicated they were retired, homemakers, not working due to incapacity, or in education. The final analysis included 4540 individuals.

The biomarkers were high-sensitivity C-reactive protein (CRP) and fibrinogen, measured in mg per litre and grams per litre, respectively. Employment status at the time of the Wave 2 interview was used to define employment status and contract type (if employed). This is used as a proxy for employment status at the time of the nurse visit, although it is accepted that some participants may have changed their employment status between the two interviews.

Individual characteristics (age, sex, and partnership status), socio-economic characteristics (highest level of education and subjective financial status), and health characteristics (smoker status, obesity (BMI<25>), presence of chronic medical conditions, use of prescription and non-prescription medications, and alcohol consumption) were used as control variables due to their associations with inflammation (Nabi et al., 2008, Hughes and Kumari, 2017, Kalousova and Burgard, 2014). BMI was calculated by weight and height measurement carried out during the nurse visit; and all other characteristics were captured in self-report during the survey interview.

Chi-squared tests for independence and simple linear regressions were used to test for difference and association in biomarkers and confounds between employment groups. Multiple linear regression was used to assess the association between the biomarkers and employment variables after controlling for different groups of confounds. An adjusted alpha level of .025 was set to adjust for multiple dependent variables (based on two biomarkers being analysed). These analyses were carried out using weights to account for response rates and survey design. Data screening indicated normally distributed errors in the case of the fibrinogen regressions, but moderate deviation from normality for the CRP regressions. The CRP scores were log-transformed to correct for this. Taking prescription medications and being diagnosed with chronic medical conditions can impact inflammation (Ballantyne and Nambi, 2005, van Rijn et al., 2014), therefore, the analyses were repeated excluding participants in these categories but were found to be consistent with the main analyses (not shown).

Results

Overall, 7.6% (weighted percentage) of the sample were unemployed. Amongst the employed, 81.8% were permanently employed, 5.3% were temporarily employed, and 12.9% were self-employed (all weighted percentages). Individual, socio-economic, and health characteristics are presented in Table 1.

The unemployed had significantly higher levels of fibrinogen than the employed group as a whole, as well as each of the employment subgroups. The unemployed also had significantly higher levels of CRP relative to the employed and self-employed subgroup, but not relative to the temporary or permanent employed subgroups. There was a moderate positive correlation between the two biomarkers (Pearson's r (unweighted)=0.43).

Tables 2 and 3 present the regressions for CRP (log-transformed) and fibrinogen, including the employment variables and controls. CRP levels (log-transformed) amongst the unemployed group

were significantly different to the whole employed group when controlling for individual characteristics alone; but differences were nullified when controlling for all confounds (Table 2; models 1-4a). In contrast, the unemployed group have significantly higher levels of fibrinogen compared to the employed in each model (Table 2; models 1-4b). When comparing each employment subgroup, CRP was significantly different between the unemployed and self-employed and permanently employed when controlling for individual characteristics alone; but differences were nullified when controlling for all confounds (Table 3; models 1-4a). Fibrinogen differs significantly between the unemployed and permanent and self-employed in all levels of control; but there are no significant differences between the unemployed and the temporary employed (Table 3; models 1-4b). Thus, for fibrinogen the protection of employment is no longer conferred for those that are employed on a temporary contract.

Discussion

This study is the first to evaluate differences in inflammation associated with cardiovascular health across (un)employment subgroups, looking beyond the binary categorisation of unemployed/employed. Our findings indicate that while unemployment is associated with elevated fibrinogen, comparisons to temporary employment reveal no statistically significant association when controlling for confounds. The literature on temporary employment is supportive of it being harmful to psychological health (Virtanen et al., 2005), self-rated health (Pirani and Salvini, 2015), and mortality (Kivimäki et al., 2003); and it would appear here to be similarly associated to elevated fibrinogen as unemployment. Previous work has found the health of self-employed women to be better than unemployed counterparts (Dolinsky and Caputo, 2003), however little research has been carried out comparing the groups in terms of inflammation. Whilst our findings for CRP are not in line with other studies on the topic when controlling for factors beyond individual characteristics (Janicki-Deverts et al., 2008, Hughes et al., 2015), our observations for fibrinogen are. The observation that unemployment is associated with higher fibrinogen but not with CRP is challenging

to explain given relatively few studies examining chronic stressors and both of these markers of inflammation. Although these markers are often inter-correlated, differential associations have been noted in areas such as personality traits (Allen and Laborde, 2017). Different expressions of stress (e.g. burnout, anxiety, depression) have been found to have differential associations with these markers, where depression and burnout were positively associated with CRP, but not fibrinogen (Toker et al., 2005).

It is important to acknowledge that the lack of determinable causality, the possibility of reverse causation, and that the discrepancy between blood sampling and demographic data sampling time are limitations. However, our approach accounted for several important confounds, and remained consistent when those with long-term health conditions were excluded in additional analyses (not shown). In summary, present findings indicate that temporary employment has little inflammatory difference to unemployment in regard to fibrinogen. Given the continuing rise of precarious modes of employment across the OECD (OECD, 2019), these findings have public health implications. Policy should encourage employers to expand the use of permanent contracts.

References

- ALLEN, M. S. & LABORDE, S. 2017. Five factor personality traits and inflammatory biomarkers in the English longitudinal study of aging. *Personality and Individual Differences*, 111, 205-210.
- BALLANTYNE, C. M. & NAMBI, V. 2005. Markers of inflammation and their clinical significance. *Atherosclerosis Supplements*, 6, 21-29.
- DOLINSKY, A. L. & CAPUTO, R. K. 2003. Health and female self-employment. *Journal of Small Business Management*, 41, 233-241.
- DUPRE, M. E., GEORGE, L. K., LIU, G. & PETERSON, E. D. 2012. The cumulative effect of unemployment on risks for acute myocardial infarction. *Archives of Internal Medicine*, 172, 1731-1737.
- GALLAGHER, S., SUMNER, R. C., MULDOON, O. T., CREAVER, A.-M. & HANNIGAN, A. 2016. Unemployment is associated with lower cortisol awakening and blunted dehydroepiandrosterone responses. *Psychoneuroendocrinology*, 69, 41-49.
- GUSTAFSSON, P. E., JANLERT, U., VIRTANEN, P. & HAMMARSTRÖM, A. 2012. The association between long-term accumulation of temporary employment, the cortisol awakening response and circadian cortisol levels. *Psychoneuroendocrinology*, 37, 789-800.
- HINTIKKA, J., LEHTO, S. M., NISKANEN, L., HUOTARI, A., HERZIG, K.-H., KOIVUMAA-HONKANEN, H., HONKALAMPI, K., SINIKALLIO, S. & VIINAMÄKI, H. 2009. Unemployment and ill health: A connection through inflammation? *BMC Public Health*, 9, 1-6.

- HUGHES, A. & KUMARI, M. 2017. Unemployment, underweight, and obesity: Findings from Understanding Society (UKHLS). *Preventive Medicine*, 97, 19-25.
- HUGHES, A., KUMARI, M., MCMUNN, A. & BARTLEY, M. 2017. Unemployment and inflammatory markers in England, Wales and Scotland, 1998–2012: Meta-analysis of results from 12 studies. *Brain, Behavior, and Immunity*, 64, 91-102.
- HUGHES, A., MCMUNN, A., BARTLEY, M. & KUMARI, M. 2015. Elevated inflammatory biomarkers during unemployment: modification by age and country in the UK. *Journal of Epidemiology and Community Health*, 69, 673-679.
- JANICKI-DEVERTS, D., COHEN, S., MATTHEWS, K. A. & CULLEN, M. R. 2008. History of unemployment predicts future elevations in C-reactive protein among male participants in the Coronary Artery Risk Development in Young Adults (CARDIA) study. *Annals of Behavioral Medicine*, 36, 176-185.
- KALOUSOVA, L. & BURGARD, S. A. 2014. Unemployment, measured and perceived decline of economic resources: Contrasting three measures of recessionary hardships and their implications for adopting negative health behaviors. *Social Science & Medicine*, 106, 28-34.
- KIVIMÄKI, M., VAHTERA, J., VIRTANEN, M., ELOVAINIO, M., PENTTI, J. & FERRIE, J. E. 2003. Temporary employment and risk of overall and cause-specific mortality. *American Journal of Epidemiology*, 158, 663-668.
- MCFALL, S. L., PETERSEN, J., KAMINSKA, O. & LYNN, P. 2014. Understanding Society –UK Household Longitudinal Study: Waves 2 and 3 Nurse Health Assessment, 2010-2012, Guide to Nurse Health Assessment. Colchester: University of Essex: Institute for Social and Economic Research, University of Essex.
- NABI, H., SINGH-MANOUX, A., SHIPLEY, M., GIMENO, D., MARMOT, M. G. & KIVIMAKI, M. 2008. Do psychological factors affect inflammation and incident coronary heart disease. *The Whitehall II Study*, 28, 1398-1406.
- OECD. 2019. *OECD Stat Extracts, 2019* [Online]. Available: <http://www.oecd.org/statistics/> [Accessed 23 Feb 2019].
- PATZELT, H. & SHEPHERD, D. A. 2011. Negative emotions of an entrepreneurial career: Self-employment and regulatory coping behaviors. *Journal of Business Venturing*, 26, 226-238.
- PIRANI, E. & SALVINI, S. 2015. Is temporary employment damaging to health? A longitudinal study on Italian workers. *Social Science & Medicine*, 124, 121-131.
- ROELFS, D. J., SHOR, E., DAVIDSON, K. W. & SCHWARTZ, J. E. 2011. Losing life and livelihood: A systematic review and meta-analysis of unemployment and all-cause mortality. *Social Science & Medicine*, 72, 840-854.
- SUMNER, R. C. & GALLAGHER, S. 2017. Unemployment as a chronic stressor: A systematic review of cortisol studies. *Psychology & Health*, 32, 289-311.
- THORLEY, C. & COOK, W. 2017. Flexibility for who? Millennials and mental health in the modern labour market. IPPR.
- TOKER, S., SHIROM, A., SHAPIRA, I., BERLINER, S. & MELAMED, S. 2005. The association between burnout, depression, anxiety, and inflammation biomarkers: C-reactive protein and fibrinogen in men and women. *Journal of Occupational Health Psychology*, 10, 344-362.
- UNIVERSITY OF ESSEX & INSTITUTE FOR SOCIAL AND ECONOMIC RESEARCH 2014. Understanding Society: Waves 2-3 Nurse Health Assessment, 2010- 2012 [data collection] 3rd edition. In: UK DATA SERVICE (ed.). Colchester, Essex: UK Data Service.
- UNIVERSITY OF ESSEX, INSTITUTE FOR SOCIAL AND ECONOMIC RESEARCH & NATCEN SOCIAL RESEARCH 2015. Understanding Society: Waves 1-5, 2009-2014 [computer file] 7th edition. . In: UK DATA SERVICE (ed.). Colchester, Essex, UK: Data Archive.
- VAN RIJN, R. M., ROBROEK, S. J. W., BROUWER, S. & BURDORF, A. 2014. Influence of poor health on exit from paid employment: A systematic review. *Occupational and Environmental Medicine*, 71, 295-301.

VIRTANEN, M., KIVIMÄKI, M., JOENSUU, M., VIRTANEN, P., ELOVAINIO, M. & VAHTERA, J. 2005.
Temporary employment and health: A review. *International Journal of Epidemiology*, 34,
610-622.

Research Highlights

- Unemployed have higher levels of fibrinogen and CRP than employed.
- Controlling for confounds equalises CRP differences in (un)employed groups.
- Higher fibrinogen in unemployed is observed in temporary employed also.
- Supporting health in the unemployed and temporary employed should be prioritised.

Tables

Table 1. Individual, socio-economic and health behaviours and conditions characteristics by employment group

Variable		Unemployed (N=305)	Employed (N=4235)	Permanent Employed (N=3500)	Temporary Employed (N=197)	Self-Employed (N=538)	
		Weighted column %	Weighted column %	Weighted column %	Weighted column %	Weighted column %	
Age category (years)	16-24	23.4	8.4	7.6	32.9	3.8	
	25-35	17.9	21.0	21.6	18.2	18.4	
	35-44	17.3	24.3	25.5	13.6	21.4	***
	45-54	24.0	28.7	29.0	19.9	30.5	
	55-64	17.5	17.6	16.4	15.4	25.9	
Sex	Male	55.5	54.0	51.8	46.6	70.8	***
	Female	44.5	46.0	48.2	53.4	29.2	
Partnership status	Partnered	37.3	72.6	72.4	61.3	79.2	***
	Not Partnered	62.7	27.4	27.6	38.7	20.9	***
Level of Education	Degree	10.1	28.3	27.6	34.6	30.4	
	Other higher degree	7.3	14.3	14.3	14.6	13.9	
	Secondary 18 or other	35.2	30.6	30.1	33.7	32.7	***
	Secondary 16	28.8	21.2	22.7	10.7	15.9	
	No qualifications	18.8	5.6	5.3	6.5	7.2	
Subjective Financial Status	Finding it quite or very difficult	37.7	9.3	9.0	11.6	10.3	
	Just about getting by	41.6	26.3	26.3	22.4	27.9	***
	Doing alright	14.4	36.5	36.5	37.1	36.2	
	Living comfortably	6.3	27.9	27.2	28.9	25.7	
Smoker status	Non-smoker	49.5	77.9	77.6	79.7	79.0	***
	Smoker	50.1	22.1	22.4	20.3	21.0	***
Obesity (BMI)	<25	35.3	30.9	30.6	40.4	29.1	
	25+	64.7	69.1	69.4	59.6	70.9	
Long-standing illness or disability	None	66.7	75.6	75.5	79.0	75.1	*
	1+	33.3	24.4	24.6	21.0	24.9	
Prescription medicines	None	54.8	59.7	58.8	65.7	63.0	*
	1+	45.2	40.3	41.2	34.3	37.0	

Days consumed alcohol in previous week	<5	89.0	86.2	87.2	87.1	79.7	
	5+	11.0	13.8	12.8	12.9	20.3	*
CRP: mean (SE)		3.8 (0.56)	2.6 (0.09)	2.7(0.10)	2.4(0.40)	2.2 (0.17)	**
CRP (log-transformed): mean (SE)		0.48 (0.08)	0.30 (0.02)	0.31 (0.02)	0.24 (0.10)	0.23 (0.05)	*
Fibrinogen: mean (SE)		2.8 (0.04)	2.6(0.01)	2.7(0.01)	2.6(0.05)	2.7(0.03)	**

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. All comparisons made to unemployed group

Table 2: Multiple linear regressions for the association between binary measure of employment status and CRP and Fibrinogen after controlling individual, socio-economic and health behaviours and conditions characteristics

	C-Reactive Protein (log transformed)												Fibrinogen											
	Model 1a: Individual characteristics			Model 2a: Individual & SES characteristics			Model 3a: Individual & health behaviour and conditions characteristics			Model 4a: Individual, SES & health behaviour & conditions characteristics			Model 1b: Individual characteristics			Model 2b: Individual & SES characteristics			Model 3b: Individual & health behaviour and conditions characteristics			Model 4b: Individual, SES & health behaviour & conditions characteristics		
	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>
<i>Employment status</i> (Unemployed) Employed	-0.22	0.08	0.008	-0.08	0.08	0.347	-0.11	0.08	0.148	-0.05	0.08	0.580	-0.20	0.04	<0.001	-0.14	0.04	0.001	-0.14	0.04	0.001	-0.119	0.043	0.006
<i>Sex</i> (Male) Female	0.19	0.04	<0.001	0.20	0.04	<0.001	0.20	0.04	<0.001	0.21	0.04	<0.001	0.13	0.02	<0.001	0.13	0.02	<0.001	0.14	0.02	<0.001	0.141	0.018	<0.001
<i>Age category</i> (years) (16-24) 25-34	0.12	0.11	0.268	0.13	0.11	0.244	0.02	0.11	0.852	0.03	0.11	0.811	0.13	0.05	0.009	0.14	0.05	0.007	0.09	0.05	0.056	0.098	0.049	0.046
35-44	0.20	0.10	0.047	0.20	0.10	0.053	0.03	0.10	0.794	0.03	0.10	0.797	0.29	0.05	<0.001	0.28	0.05	<0.001	0.23	0.05	<0.001	0.230	0.048	0.000
45-54	0.28	0.10	0.007	0.25	0.10	0.011	0.06	0.10	0.557	0.05	0.10	0.616	0.35	0.05	<0.001	0.34	0.05	<0.001	0.28	0.05	<0.001	0.278	0.047	0.000
55-64	0.38	0.10	<0.001	0.36	0.10	<0.001	0.13	0.10	0.220	0.11	0.10	0.269	0.45	0.05	<0.001	0.44	0.05	<0.001	0.38	0.05	<0.001	0.376	0.050	0.000
<i>Partnership Status</i> (Unpartnered) Partnered	0.02	0.05	0.722	0.04	0.05	0.402	0.00	0.05	0.957	0.01	0.05	0.909	-0.01	0.02	0.678	0.00	0.02	0.989	-0.01	0.02	0.636	-0.008	0.023	0.717
<i>Education Level</i> (Degree) Other higher degree				0.10	0.06	0.074				0.03	0.05	0.533				0.06	0.04	0.107				0.026	0.034	0.443
Secondary 18 or other				0.14	0.05	0.004				0.07	0.05	0.145				0.08	0.02	0.002				0.043	0.024	0.079
Secondary 16 No qualifications				0.16	0.06	0.004				0.09	0.06	0.116				0.08	0.03	0.003				0.041	0.027	0.132
<i>Subjective financial status</i> (Finding it quite or very difficult) Just about getting by				0.40	0.08	<0.001				0.30	0.07	<0.001				0.19	0.04	<0.001				0.131	0.041	0.001
Doing alright				-0.10	0.07	0.173				-0.04	0.07	0.571				-0.02	0.03	0.576				0.007	0.033	0.836
Living comfortably				-0.15	0.07	0.039				-0.06	0.07	0.388				-0.06	0.03	0.082				-0.014	0.033	0.675
<i>Smoker status</i> (Non-smoker)				-0.29	0.07	<0.001				-0.15	0.07	0.030				-0.10	0.03	0.004				-0.036	0.034	0.282
																0.18	0.02	<0.001				0.157	0.025	<0.001

Smoker				0.26	0.05	<0.001	0.21	0.05	<0.001															
Obesity (<25)																								
25+				0.57	0.04	<0.001	0.56	0.04	<0.001				0.23	0.02	<0.001	0.222	0.019	<0.001						
Prescription Medications (None)																								
1+				0.28	0.04	<0.001	0.27	0.04	<0.001				0.06	0.02	0.004	0.059	0.022	0.007						
Long-standing impairment, illness or disability (None)																								
1+				0.05	0.04	0.238	0.04	0.04	0.340				0.00	0.02	0.943	-0.002	0.023	0.930						
Days consumed alcohol in previous week (<5)																								
5+				-0.08	0.05	0.109	-0.05	0.05	0.255				-0.10	0.03	0.000	-0.094	0.028	0.001						
Constant	0.20	0.11	0.079	0.10	0.13	0.447	-0.29	0.11	0.011	-0.33	0.12	0.008	2.52	0.05	<0.001	2.46	0.06	<0.001	2.31	0.05	<0.001	2.272	0.058	<0.001
R-Squared	0.02			0.04			0.11			0.12			0.07			0.08			0.12			0.13		

Significant associations are highlighted in bold ($p < 0.025$). Reference categories shown in brackets.

Table 3: Multiple linear regressions for the association between employment subtypes and CRP and Fibrinogen after controlling individual, socio-economic and health behaviours and conditions characteristics

	C-Reactive Protein (log transformed)												Fibrinogen												
	Model 1a: Individual characteristics			Model 2a: Individual & SES characteristics			Model 3a: Individual & health behaviour and conditions characteristics			Model 4a: Individual, SES & health behaviour & conditions characteristics			Model 1b: Individual characteristics			Model 2b: Individual & SES characteristics			Model 3b: Individual & health behaviour and conditions characteristics			Model 4b: Individual, SES & health behaviour & conditions characteristics			
	β	SE	p	β	SE	p	β	SE	p	β	SE	p	β	SE	p	β	SE	p	β	SE	p	β	SE	p	
<i>Employment status</i>																									
(Unemployed)																									
Permanent employed	-0.21	0.08	0.013	-0.07	0.08	0.419	-0.11	0.08	0.166	-0.04	0.08	0.625	-0.20	0.04	<0.001	-0.14	0.04	0.001	-0.15	0.04	<0.001	-0.13	0.04	0.004	
Temporary employed	-0.23	0.13	0.074	-0.09	0.14	0.516	-0.10	0.12	0.398	-0.03	0.13	0.796	-0.14	0.06	0.030	-0.07	0.06	0.254	-0.07	0.06	0.244	-0.04	0.06	0.476	
Self-employed	-0.28	0.09	0.002	-0.15	0.09	0.116	-0.15	0.09	0.094	-0.09	0.09	0.342	-0.21	0.05	<0.001	-0.15	0.05	0.004	-0.14	0.05	0.005	-0.11	0.05	0.023	
<i>Sex</i>																									
(Male)																									
Female	0.19	0.04	<0.001	0.19	0.04	<0.001	0.20	0.04	<0.001	0.20	0.04	<0.001	0.13	0.02	<0.001	0.13	0.02	<0.001	0.14	0.02	<0.001	0.14	0.02	<0.001	
<i>Age category (years)</i>																									
(16-24)																									
25-34	0.12	0.11	0.266	0.12	0.11	0.241	0.02	0.11	0.834	0.03	0.11	0.792	0.14	0.05	0.005	0.15	0.05	0.004	0.10	0.05	0.034	0.11	0.05	0.027	
35-44	0.20	0.10	0.045	0.20	0.10	0.050	0.03	0.10	0.772	0.03	0.10	0.774	0.30	0.05	<0.001	0.29	0.05	<0.001	0.24	0.05	<0.001	0.24	0.05	<0.001	
45-54	0.28	0.10	0.006	0.26	0.10	0.010	0.06	0.10	0.531	0.05	0.10	0.586	0.36	0.05	<0.001	0.35	0.05	<0.001	0.29	0.05	<0.001	0.29	0.05	<0.001	
55-64	0.39	0.10	<0.001	0.37	0.10	0.000	0.13	0.10	0.197	0.12	0.10	0.240	0.46	0.05	<0.001	0.45	0.05	<0.001	0.39	0.05	<0.001	0.39	0.05	<0.001	
<i>Partnership Status</i>																									
(Unpartnered)																									
Partnered	0.02	0.05	0.700	0.04	0.05	0.384	0.00	0.05	0.968	0.01	0.05	0.894	-0.01	0.02	0.667	0.00	0.02	0.978	-0.01	0.02	0.614	-0.01	0.02	0.695	
<i>Education Level</i>																									
(Degree)																									
Other higher degree				0.10	0.06	0.078				0.03	0.05	0.539				0.06	0.04	0.101				0.03	0.03	0.424	
Secondary 18 or other				0.14	0.05	0.005				0.07	0.05	0.149				0.08	0.02	0.002				0.04	0.02	0.071	
Secondary 16 No qualifications				0.16	0.06	0.005				0.09	0.06	0.124				0.09	0.03	0.002				0.05	0.03	0.100	
<i>Subjective financial status</i>																									
Finding it quite or very difficult																									
Just about getting by				-0.10	0.07	0.164				-0.04	0.07	0.562				-0.02	0.03	0.599				0.01	0.03	0.795	
Doing alright				-0.15	0.07	0.035				-0.06	0.07	0.376				-0.06	0.03	0.086				-0.01	0.03	0.714	

Living comfortably				-0.29	0.07	<0.001				-0.15	0.07	0.027				-0.10	0.03	0.004				-0.03	0.03	0.309			
Smoker status (Non-smoker)																											
Smoker							0.26	0.05	<0.001	0.21	0.05	<0.001										0.18	0.02	<0.001	0.16	0.02	<0.001
Obesity (<25)																											
25+							0.57	0.04	<0.001	0.56	0.04	<0.001										0.23	0.02	<0.001	0.22	0.02	<0.001
Prescription medication (None)																											
1+							0.28	0.04	<0.001	0.27	0.04	<0.001										0.06	0.02	0.004	0.06	0.02	0.006
Long-standing illness or disability (None)																											
1+							0.05	0.04	0.239	0.04	0.04	0.342										0.00	0.02	0.958	0.00	0.02	0.920
Days consumed alcohol in previous week (<5)																											
5+							-0.08	0.05	0.120	-0.05	0.05	0.278										-0.10	0.03	<0.001	-0.10	0.03	0.001
Constant	0.20	0.11	0.076	0.10	0.12	0.423	-0.29	0.11	0.011	-0.33	0.12	0.008	2.52	0.05	0.000	2.45	0.06	<0.001				2.30	0.05	<0.001	2.26	0.06	<0.001
R-Squared	0.02			0.04			0.11			0.12			0.07			0.08			0.13			0.13					

Significant associations are highlighted in bold ($p < 0.025$). Reference categories shown in brackets.