

Biological markers:
Why are they
important and what do
they tell us?



What are biomarkers

“a distinctive biological or biologically derived indicator (such as a metabolite) of a process, event, or condition (such as aging, disease, or oil formation)” Merriam-Webster

○ Examples

● Imaging

- Magnetic resonance imaging (MRI), computed tomography scan (CT), etc

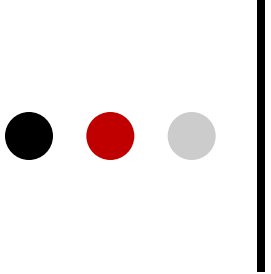
● Molecular

- Genetic markers, biochemical (protein) markers, body fluid, etc.



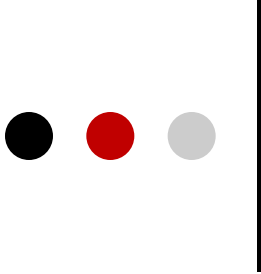
Why add biomarkers to social surveys?

- Understanding the pathways by which social circumstances influence health
 - How the social gets under the skin' - biological pathways between social factors and health
 - 'How the biological gets outside the skin' – the interaction of genes and environment

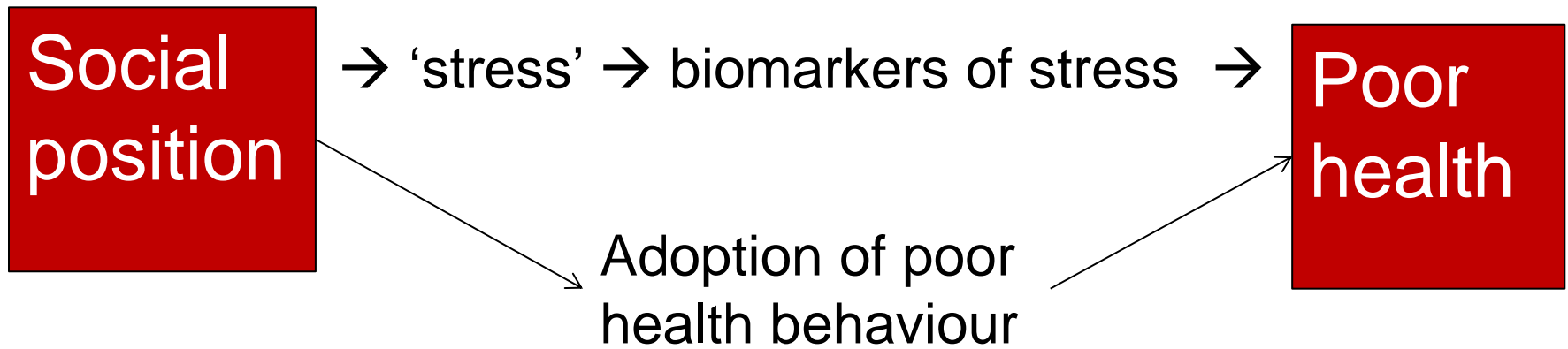


What do biomarkers tell us that self-report doesn't?

- Earlier, more precise measures of health & illness
 - Specific conditions
 - Undiagnosed illness
 - Pre-disease risk factors
 - Effectiveness of treatment

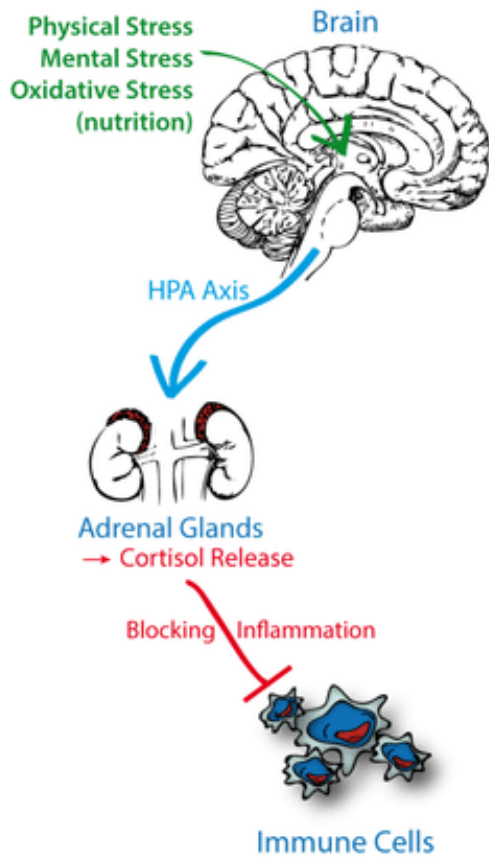


Social position and health: simplified pathway

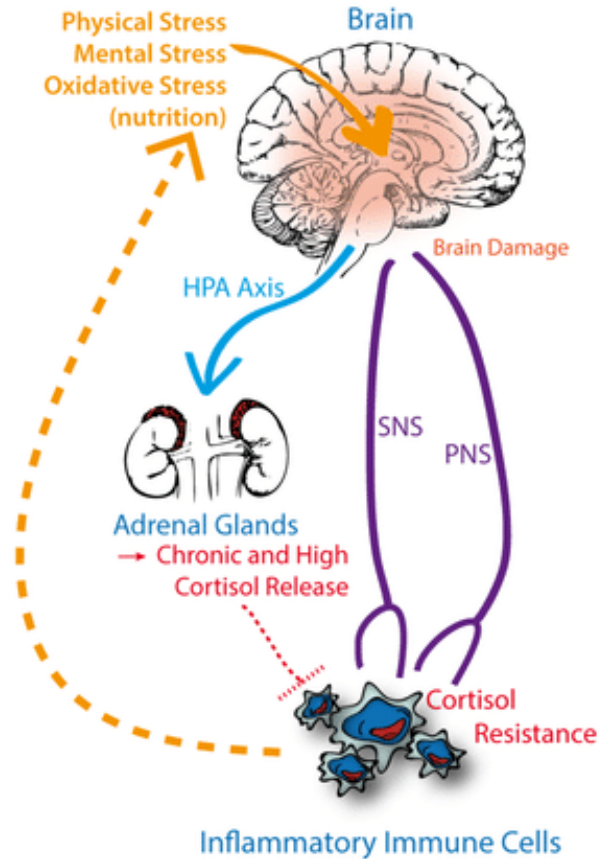




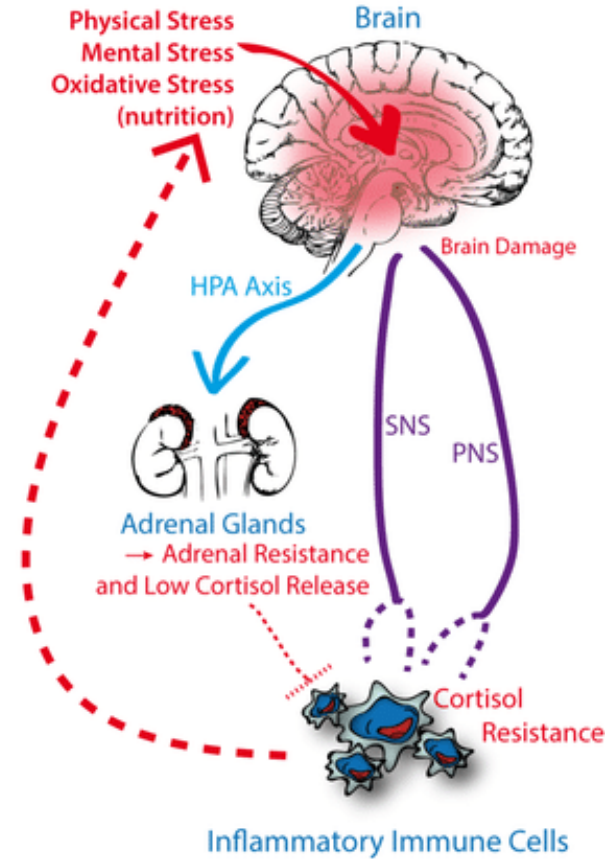
Normal Stress Response



Chronic Stress and Pathology

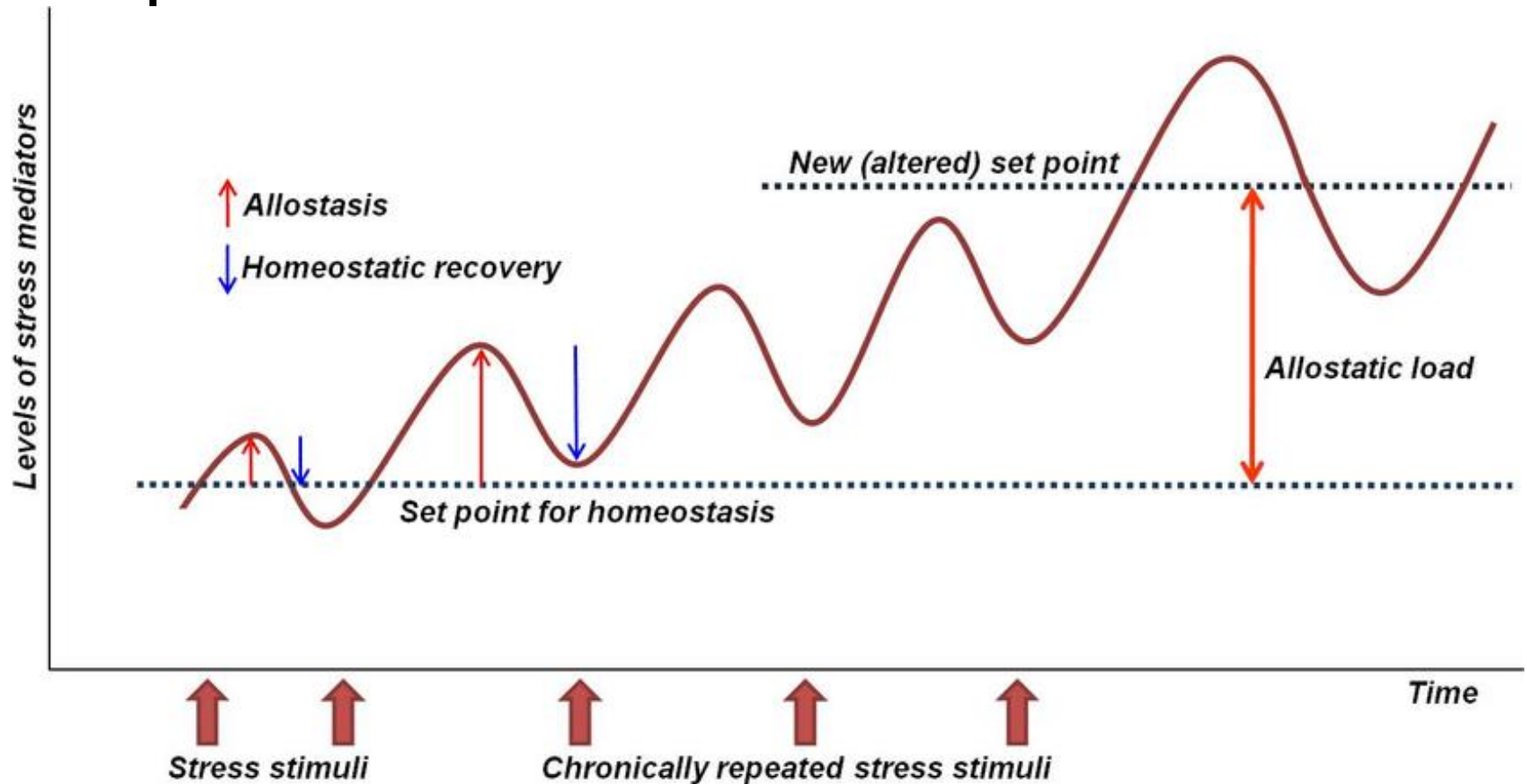


Chronic Stress and Cortisol Resistance



Depression: An Insight and Need for Personalized Psychological Stress Monitoring and Management - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Role-of-stress-induced-activation-of-HPA-axis-cortisol-and-sympathetic-nervous-system_fig3_269808355 [accessed 19 Nov, 2019]

Biomarkers and stress



Technical and clinical aspects of cortisol as a biochemical marker of chronic stress - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Stress-allostasis-and-allostatic-load-Stress-is-any-stimulus-inducing-either-adaptive_fig3_270652069 [accessed 22 Nov, 2019]



Understanding Society: the UK Household Longitudinal Study

- The world's largest long-term longitudinal survey, with approximately 40,000 UK households interviewed annually
- Successor to the British Household Panel Survey (1991-2009)
- Has collected data annually since 2009
 - Interviews with all household members 16 years and older
 - Self-completion questionnaire with all 10-15 year olds
- Designed to analyse social change
 - Has been used to inform UK policies across a variety of topics



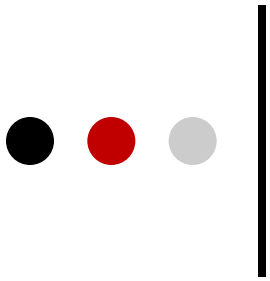
Understanding Society

Biomarkers

- Collected in waves 2 and 3
- Collected from 20,700 adults in England, Scotland and Wales
 - Blood-based biomarkers from 13,107



Biomarker	What does it measure?
Height, weight, body fat	Overweight and obesity
Blood Pressure, pulse	Hypertension
Cholesterol and triglycerides	'Fat in the blood'
Glycated haemoglobin (HbA1c)	Amount of sugar in the blood
C-reactive protein (CRP), fibrinogen	Inflammation, response to stress
Haemoglobin (Hb), ferritin	Poor nutrition
Creatinine, urea	Kidney functioning
Insulin-like growth factor (IGF-1)	Building up of organs and tissues
Dihydroepiandrosterone sulphate (DHEAs)	Steroid hormone



Flexible working arrangements and markers of chronic stress

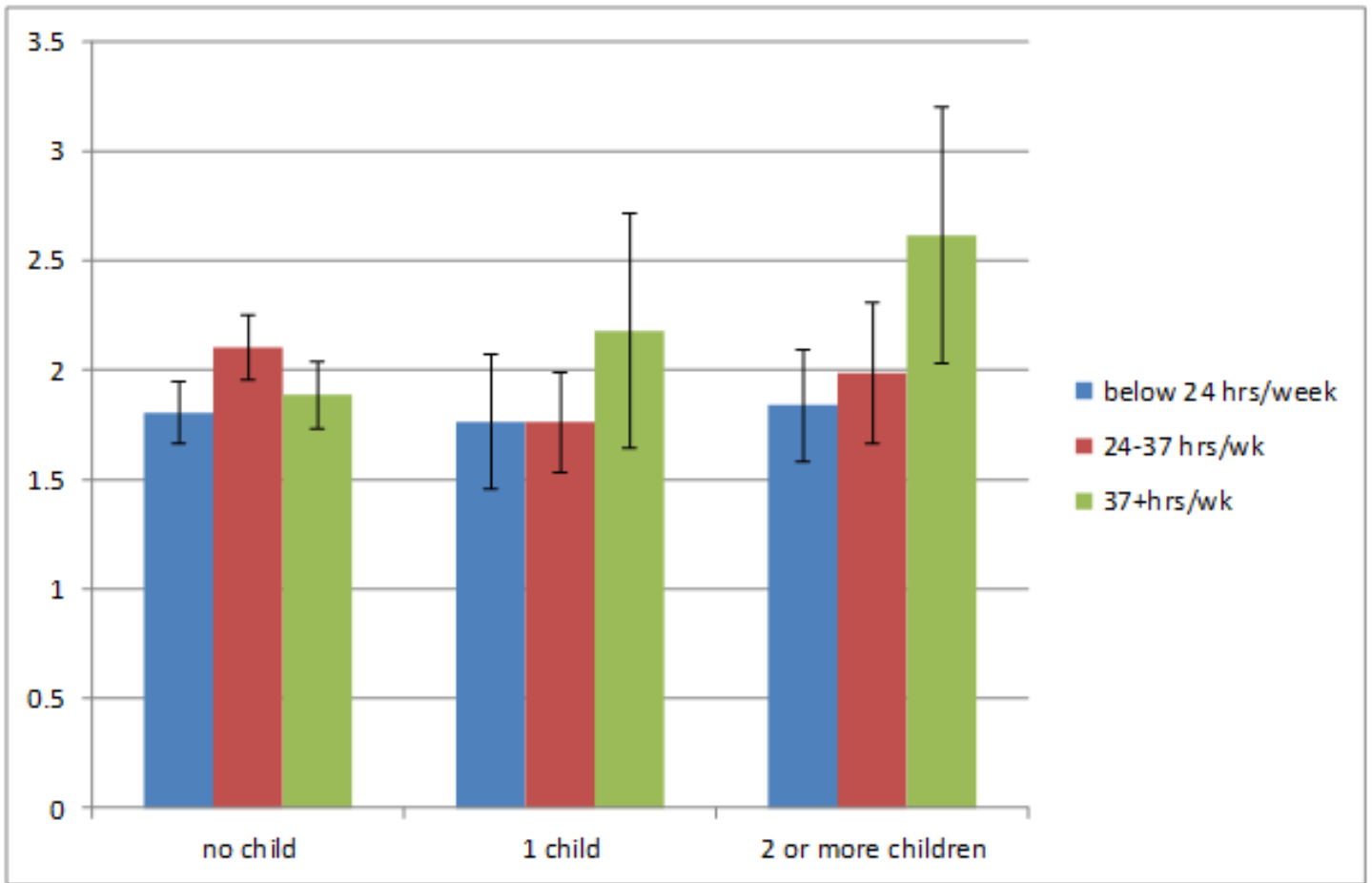


Research Questions

- Are flexible working arrangements associated with lower levels of stress?
- Is the combination of work and family stressors associated with higher levels of allostatic load?
- Is the use of flexible working arrangements associated with lower allostatic load among workers who combine childcare and longer working hours?



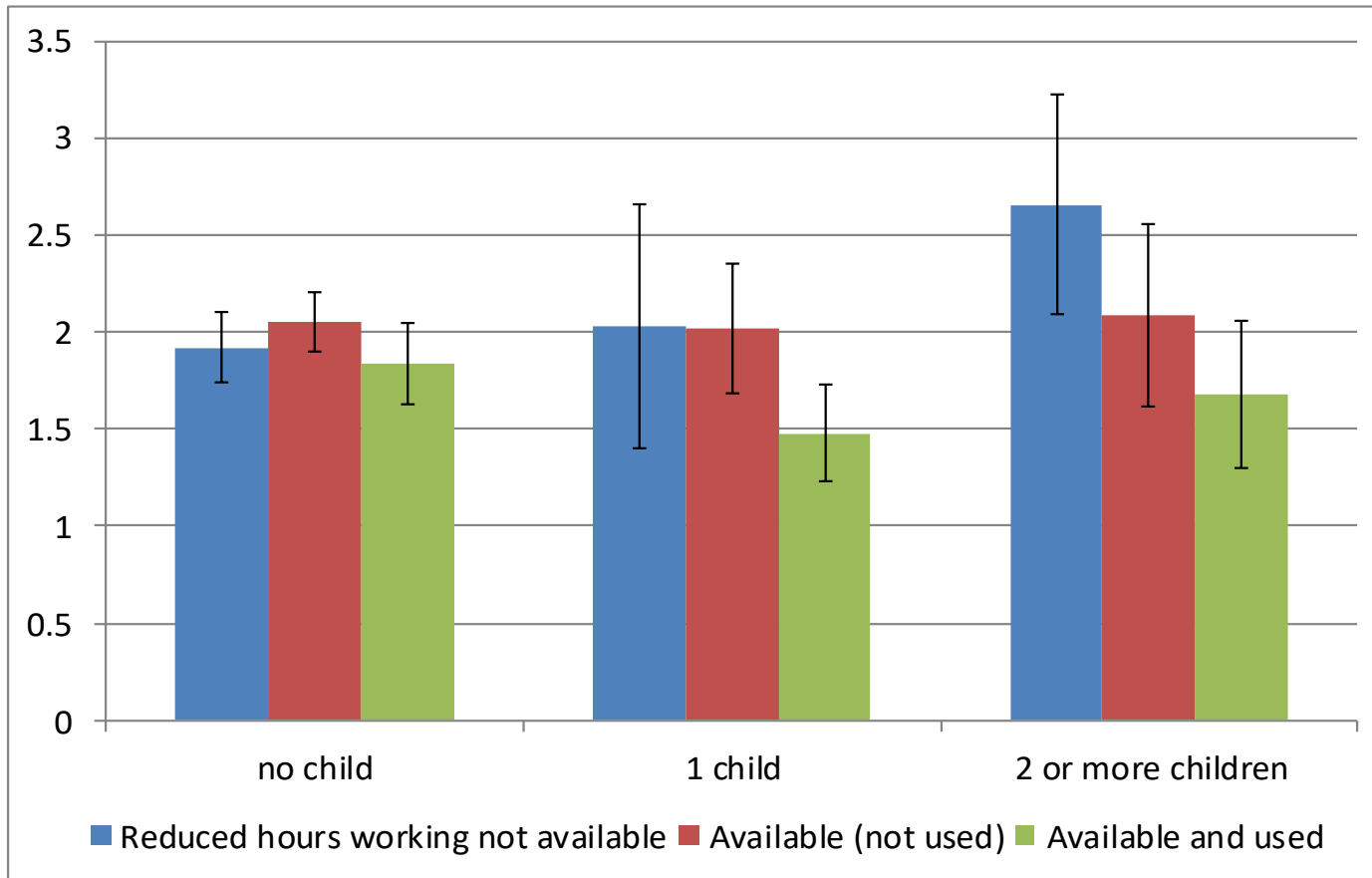
	Women and Men	p-value
Reduced hours FWA		
Not available	2.04 (1.95, 2.12)	ref
Available but not used	2.10 (1.99, 2.21)	0.35
Available & used	1.78 (1.68, 1.88)	0.001
Flextime FWA		
Not available	1.97 (1.91, 2.03)	ref
Available but not used	1.95 (1.83, 2.07)*	0.78
Available & used	2.04 (1.90, 2.18)*	0.38
Other FWA		
Not available	1.96 (1.90, 2.02)	ref
Available but not used	2.01 (1.88, 2.14)	0.53
Available & used	2.04 (1.87, 2.22)	0.41



Mothers with 2 or more children who work more have higher markers of 'chronic stress'.

Availability of 'flexible working' allostatic load

Allostatic load biomarker count



The availability and use of flexible working hours 'offsets' the impact of children on markers of 'chronic stress' in women.



Conclusions

- Findings show that individuals with different working patterns have differing levels of markers of stress
- This study highlights the importance of using biomarkers
 - They help us to understand the biological pathways by which our environment ‘gets under the skin’
 - They provide information over and above self-report
 - Undetected or early disease markers



Acknowledgments

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- Papers
 - Chandola, T., Booker, C., Benzeval, M., Kumari, M. (2019). Flexible work arrangements and biomarkers of chronic stress: Evidence of buffering of work and family stressors from the UK Household Longitudinal Study (UKHLS). *Sociology*. 53(4), 779-799.
<https://journals.sagepub.com/doi/abs/10.1177/0038038519826014>.



Thank you

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