Social relationships & partnership

Soc-B Module 1: The Biosocial Life Course
2-5 Oct 2023

Outline

- Key dimensions social relationships
- Social relationships over the life course and in relation to ageing
- Associations between social relationships & mortality, health – biomarkers as mediators?
- Evidence of links with biomarkers
  - HPA axis response
  - Inflammation
  - Blood pressure
  - Adiposity
- Gender differences

Key characteristics of social relationships

Conceptualised & studied at the both the **area/collective level** and at the **individual level**

- Structural aspects
- Functional aspects
- Partnership / marriage as a special case
- Social capital

Social Capital

Sometime used to refer broadly to the entire set of resources derived socially either at the group/area or individual level (alongside other forms of capital, eg. economic, cultural).

> "Resources that are accessed by individuals as a result of their membership of a network or group."
>
> - Kawachi & Berkman 2015

Tends to be studied at area level -- area based social attributes, rather than individual social relationships.

Also has **structural** and **functional** aspects

Social Capital

OECD definition (2001): **Networks** with shared norms, values and understanding that **facilitate co-operation** within and among groups.

Putman (2000): Social capital as a public good – If you are in an area with high social capital, you can benefit from the resources/functional aspects without individually being part of the network.

Bonding v Bridging capital

- Bonding: Resources shared within networks/groups that are ‘homophilous’. (The dark side of social capital?)
- Bridging: Resources shared across networks.

High levels of collective efficacy linked with positive area/neighbourhood outcomes

Social cohesion → Social control = Collective efficacy

Social control: Readiness of individuals in the community to take action on issues that affect the area/neighbourhood.

Social cohesion: Shared values, feelings of solidarity, mutual trust within the community.

3 avenues through which social capital may influence health or behaviour

- *Social contagion:* Behaviours spread more quickly in cohesive networks (more frequent contact).
- *Collective efficacy:* Greater capacity and willingness of group to work towards common goal through collective action (eg. creating green spaces, improving environment).
- *Informal social control:* Ability of the group to maintain social order and intervene when deviant behaviour observed.

Structural aspects of social relationships at the individual level

The **quantitative** dimensions of relationships. For eg:

- Number & diversity of people in **social networks**
- Frequency & duration of contact with people in network.
- Structural aspects sometime applied to **social participation** in organisations or social activities.
- **Social engagement** often used to refer to participation in social activities – egs., membership of voluntary organisations / religious affiliation -- and relationships more broadly.
- **Social isolation** – a lack of structural aspects of relationships.

Functional aspects of social relationships at the individual level

The **qualitative** dimensions of or **resources** derived from interactions and relationships.

At the individual level includes:

- **Positive emotional support:** egs. caring, understanding, sympathy
- **Negative emotional support**: eg. conflict
- **Practical** or **instrumental support:** eg. helping with needs – doing tasks, lending money.
- **Informational support:** eg. providing advice or information

Functional aspects of social relationships at individual level con't.

- Supportive actions but also perceived availability are important.
- '**Closeness**' – how close the relationship feels.
- **Loneliness** – a lack of functional aspects of relationships or 'perceived' social isolation.

Partnership (usually marriage) as a special case

- Main focus on marriage per se, some distinguish differences between cohabiting & married couples, increasing the two are combined.

- Structural & functional dimensions also studied
  - Structural: longitudinal data allows for studies of duration of states, timing & number of transitions.
  - Functional: relationship quality & closeness.

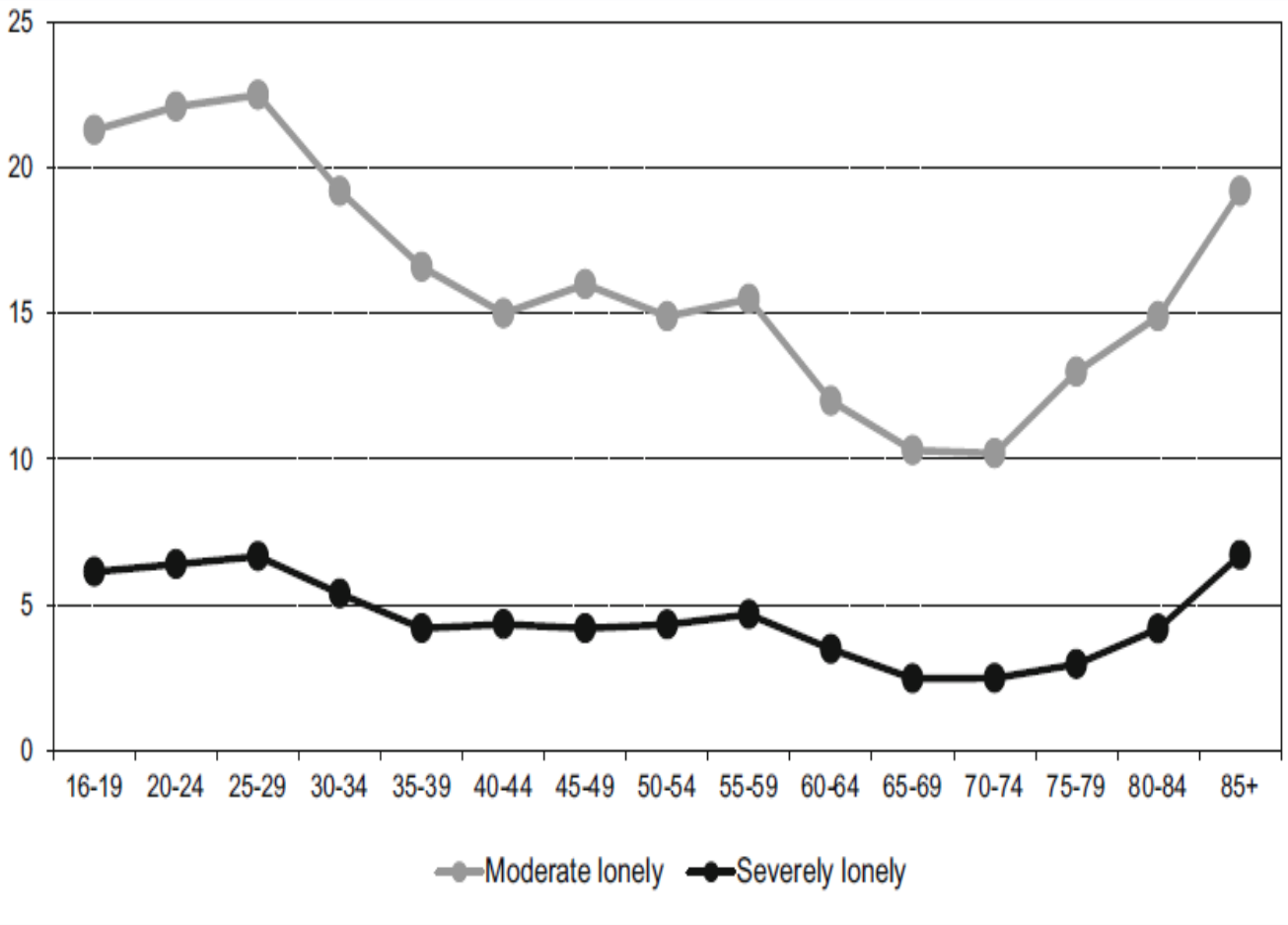
- Strong links with socioeconomic advantage

Social relationships over the life course

- Relative importance of different dimensions of social relationships may change with age.
- Life course transitions may act as pivotal moments for shifting the focus of relationships.
- The Convoy Model (Toni Antonucci) – People bring their social relationships with them through life.
- Socioemotional Selectivity Theory (Laura Carstensen) – Structural aspects decline with age accompanied by shift towards maintaining closest relationships.
- Older age of particular interest -- Retirement, widowhood, onset of functional limitations or health problems may increase risk of social isolation & loneliness.

Loneliness mainly an issue for older people?

Fig. 1 Prevalence (%) of moderate and severe loneliness across the life span



Lasgaard et al. Soc Psychiatry Psychiatr Epidemiol 2016

Social Relationships & Mortality / Health

Emile Durkheim 1858-1917

Study of suicide & social integration

"Suicide varies inversely with degree of integration of the social groups of which the individual forms a part."

-- *Suicide: a Study in Sociology*

- Suicide rates higher in protestant countries than in catholic countries.
- Social integration – the extent to which individuals are linked to and feel allegiance to social groups.
- Religious groups, family groups and political or nation groups possess the quality of social integration.

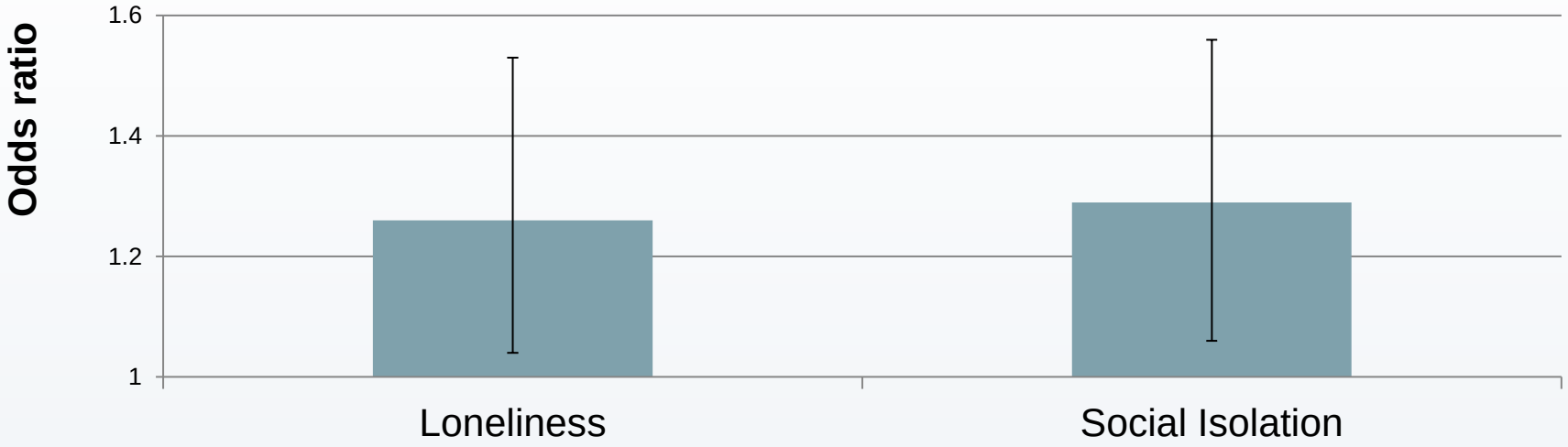
Social relationships & Health

- Main effects model: social connectedness is beneficial irrespective of whether one is under stress.

- Stress buffering model: social connections benefit health by providing psychological and material resources needed to cope with stress

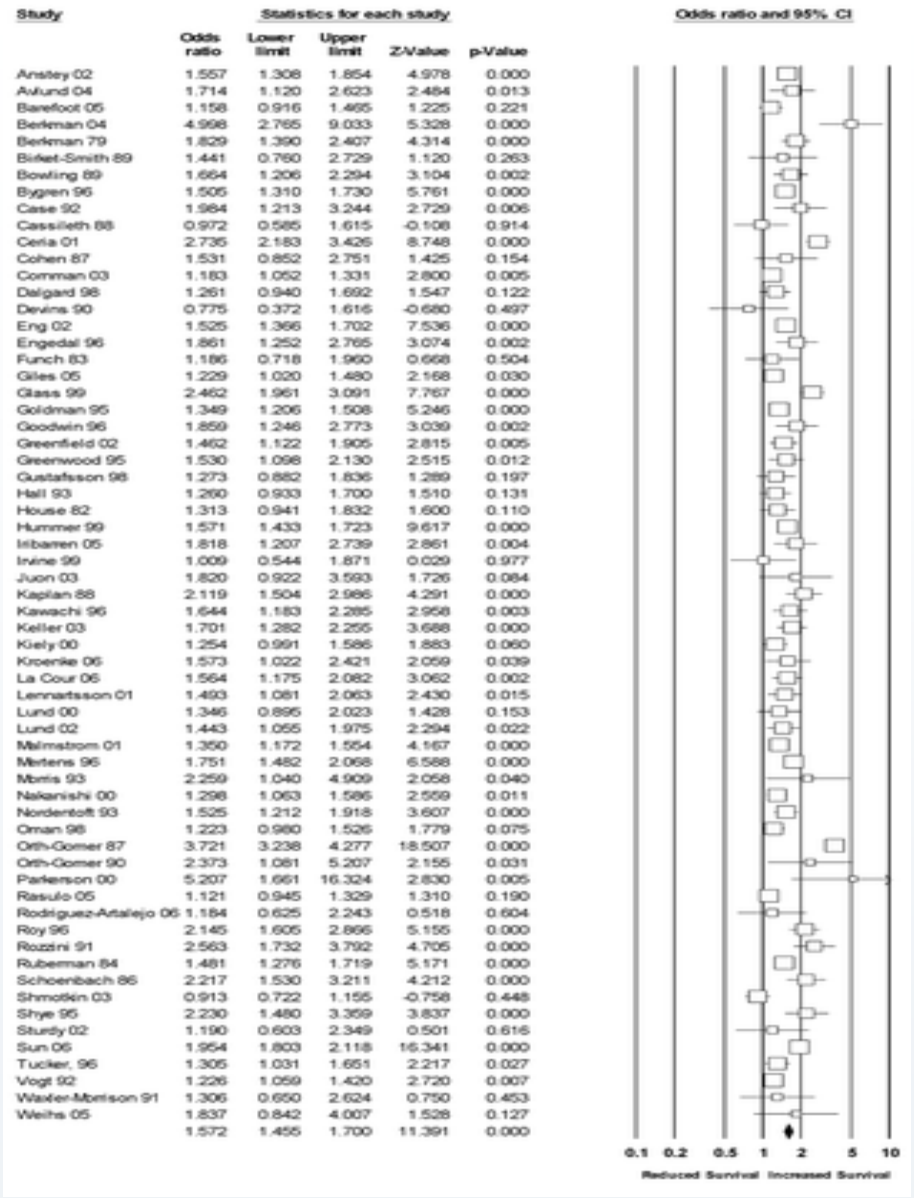
Cohen S. Social Relationships and Health. American Psychologist, Vol 59(8), Nov 2004, 676-684.

Meta-analysis of 70 studies of loneliness & social isolation as risk factors for mortality



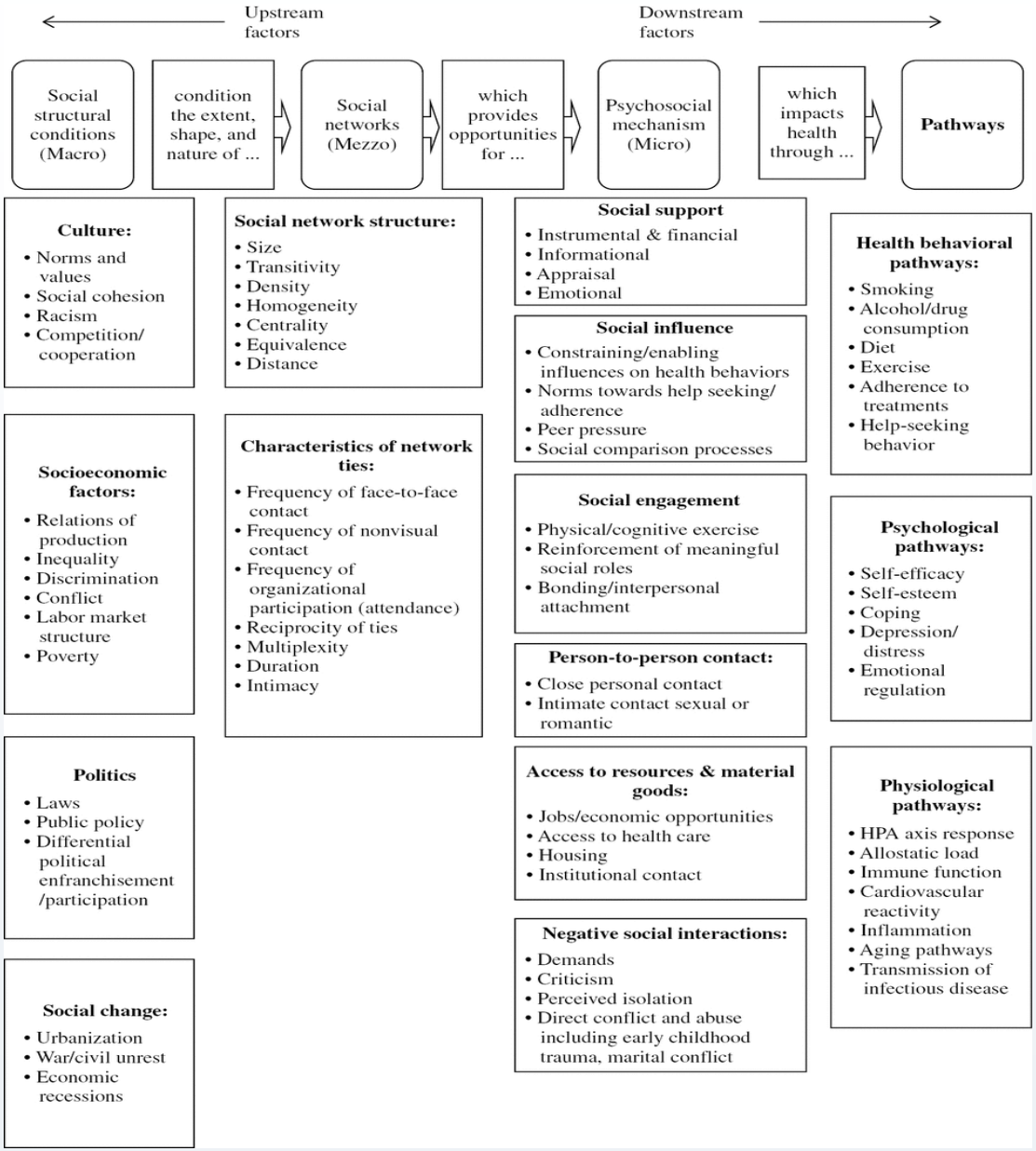
"Current evidence indicates that heightened risk for mortality from a lack of social relationships is greater than that for obesity."

Holt-Lundstad et al. Perspectives Psych Sci 2015



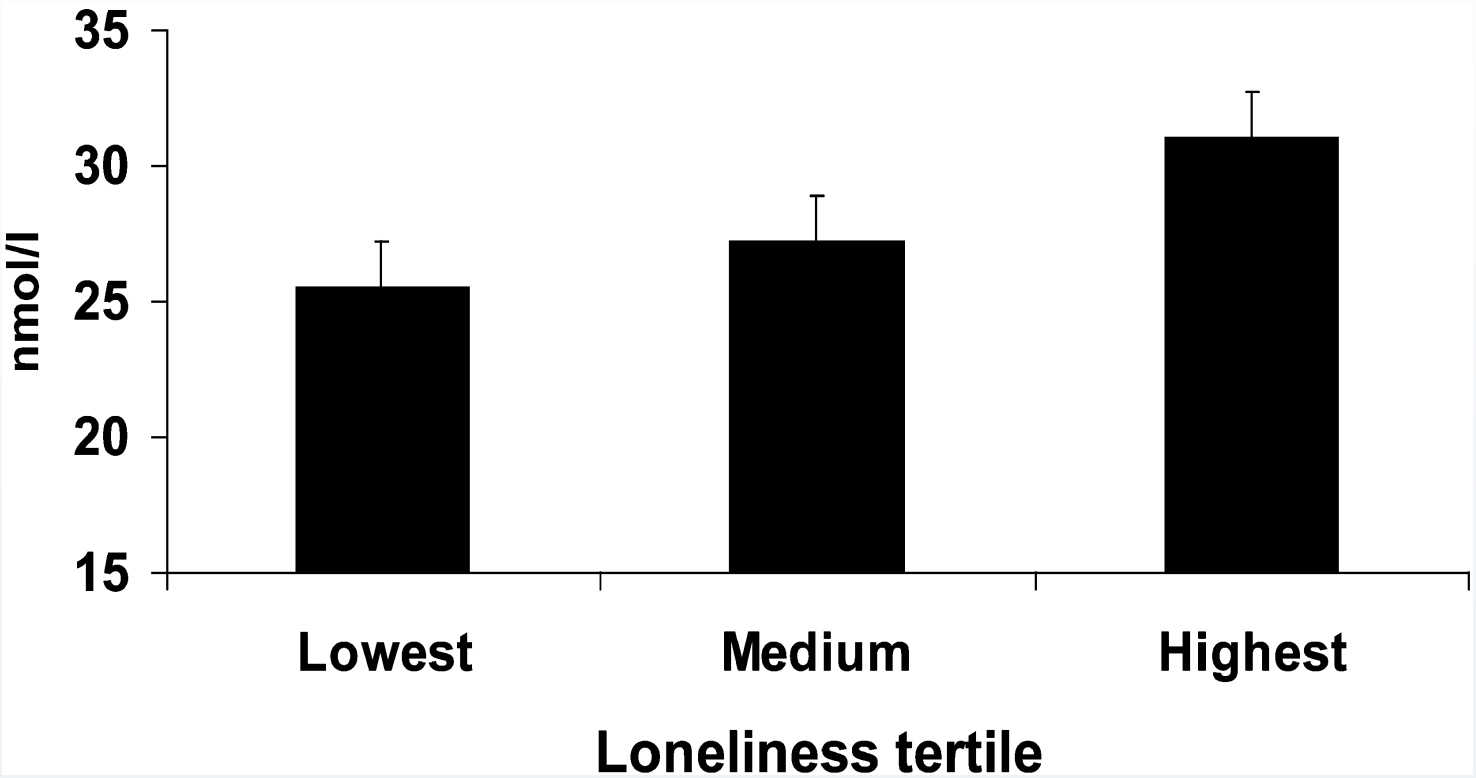
Holt-Lunstad J, Smith TB, Layton JB (2010) Social Relationships and Mortality Risk: A Meta-analytic Review. *PLOS Medicine* 7(7): e1000316. https://doi.org/10.1371/journal.pmed.1000316
http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1000316

Berkman & Krishna's Conceptual models of how social networks impact health.



Chapter: Social Network Epidemiology
Author(s): Lisa F. Berkman and Aditi Krishna
From: Social Epidemiology

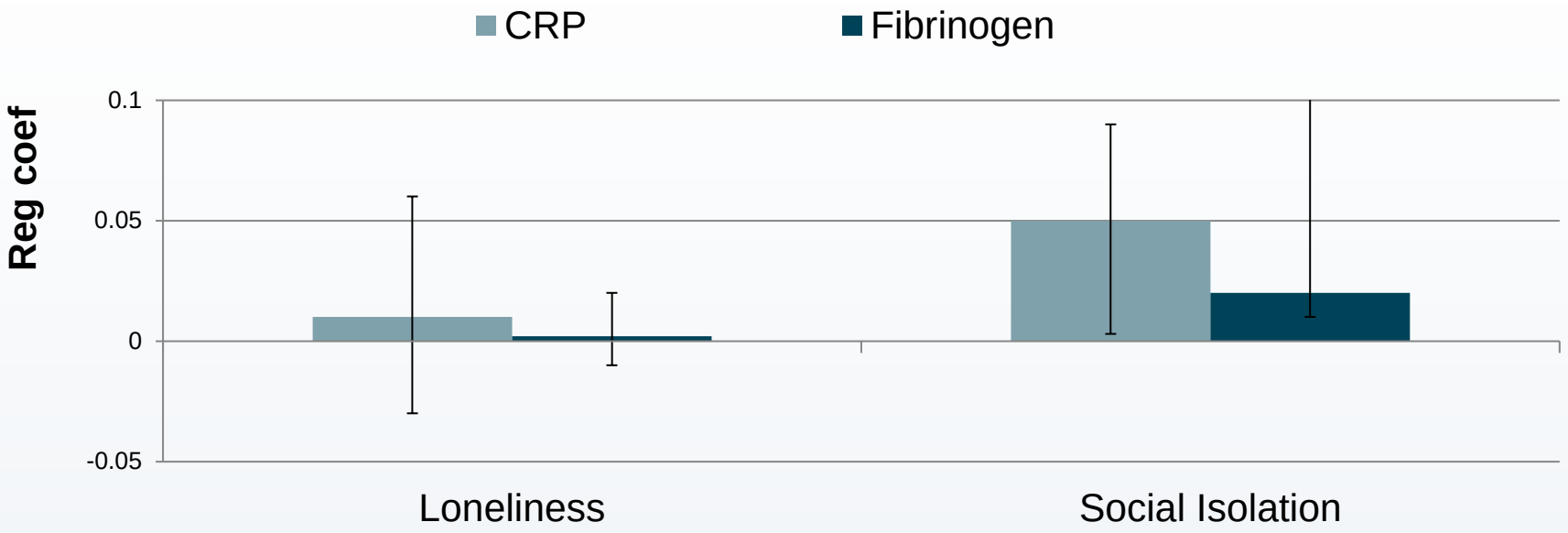
Mean increase in cortisol between waking and 30 min later in relation to loneliness tertile.



Source: Steptoe et al. PNEC 2004

Values are adjusted for waking cortisol value, sex, grade of employment, smoking, and body mass index.

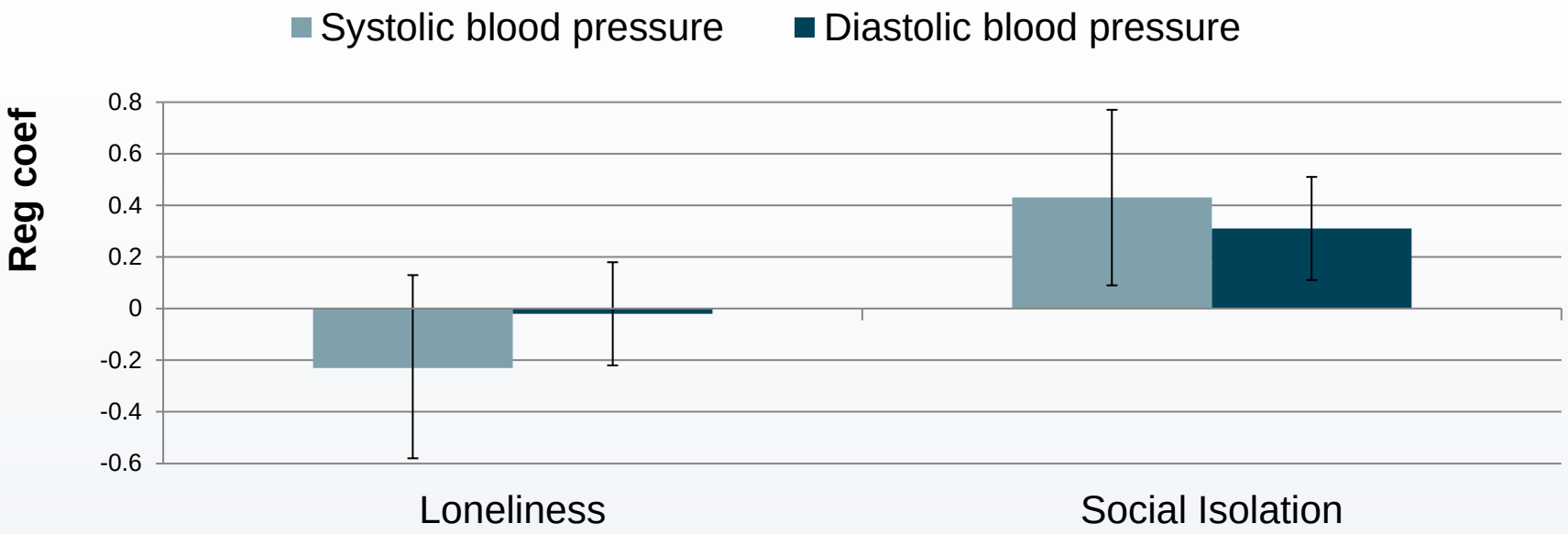
Association between loneliness & social isolation & inflammation in ELSA (cross-sectional at wave 2). (N = 5,899)



Loneliness & social isolation mutually adjusted + adjusted for age, gender, limiting long-standing illness, depressive symptoms, marital status & wealth.

Source: Shankar et al. Health Psych 2011

Association between loneliness & social isolation & blood pressure in ELSA (cross-sectional at wave 2). (N = 8,688)



Loneliness & social isolation mutually adjusted + adjusted for age, gender, limiting long-standing illness, depressive symptoms, marital status & wealth.

Source: Shankar et al. Health Psych 2011

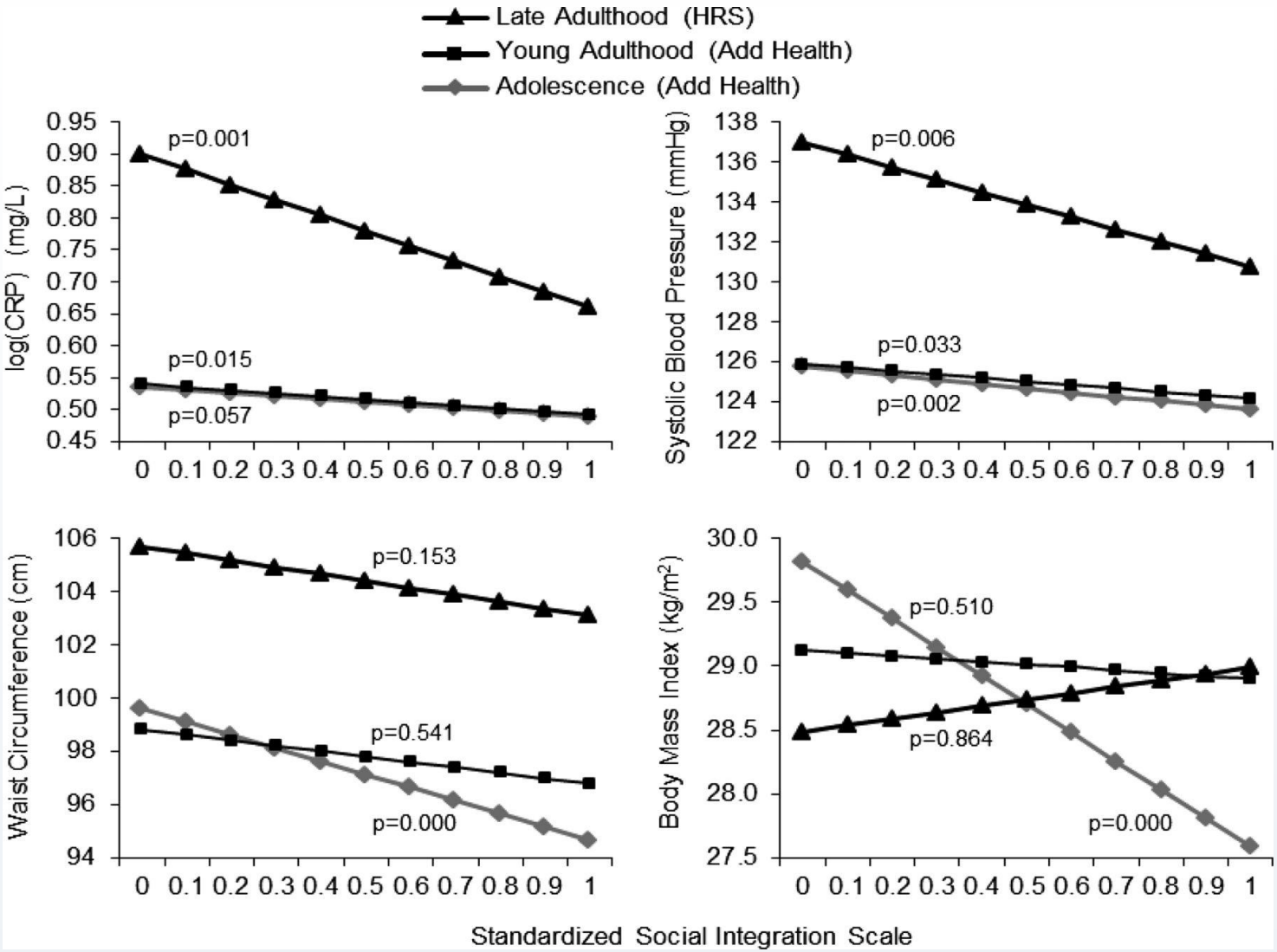
Work from SocB student rotation –
Emma Walker, *Brain, Behaviour & Immunity*

	CRP	Fibrinogen	WBC	IGF-1
Fuly-adjusted*	Coef (95% CI)	Coef (95% CI)	Coef (95% CI)	Coef (95% CI)
Social engagement	-0.01 (-0.02 to 0.001)	**-0.01 (-0.02 to -0.003)**	**-0.04 (-0.08 to -0.002)**	-0.03 (-0.12 to 0.07)
Living with somebody	**-0.06 (-0.10 to -0.02)**	**-0.10 (-0.15 to -0.05)**	**-0.24 (-0.42 to -0.06)**	0.32 (-0.2 to 0.8)
Low loneliness	-0.004 (-0.02 to 0.01)	-0.001 (-0.01 to 0.01)	-0.01 (-0.06 to 0.01)	**0.13 (0.03 to 0.24)**

*time invariant factors, marital status, employment status, wealth, chronic illness, chronic pain, alcohol consumption, smoking and sedentary behaviours, depression

Walker et al. BBI, 2019
https://doi.org/10.1016/j.bbi.2019.08.189

Prospective associations of social integration with biomarkers of physiological functioning over the life course.



Yang Claire Yang et al. PNAS 2016;113:578-583

Mediation in social isolation → mortality

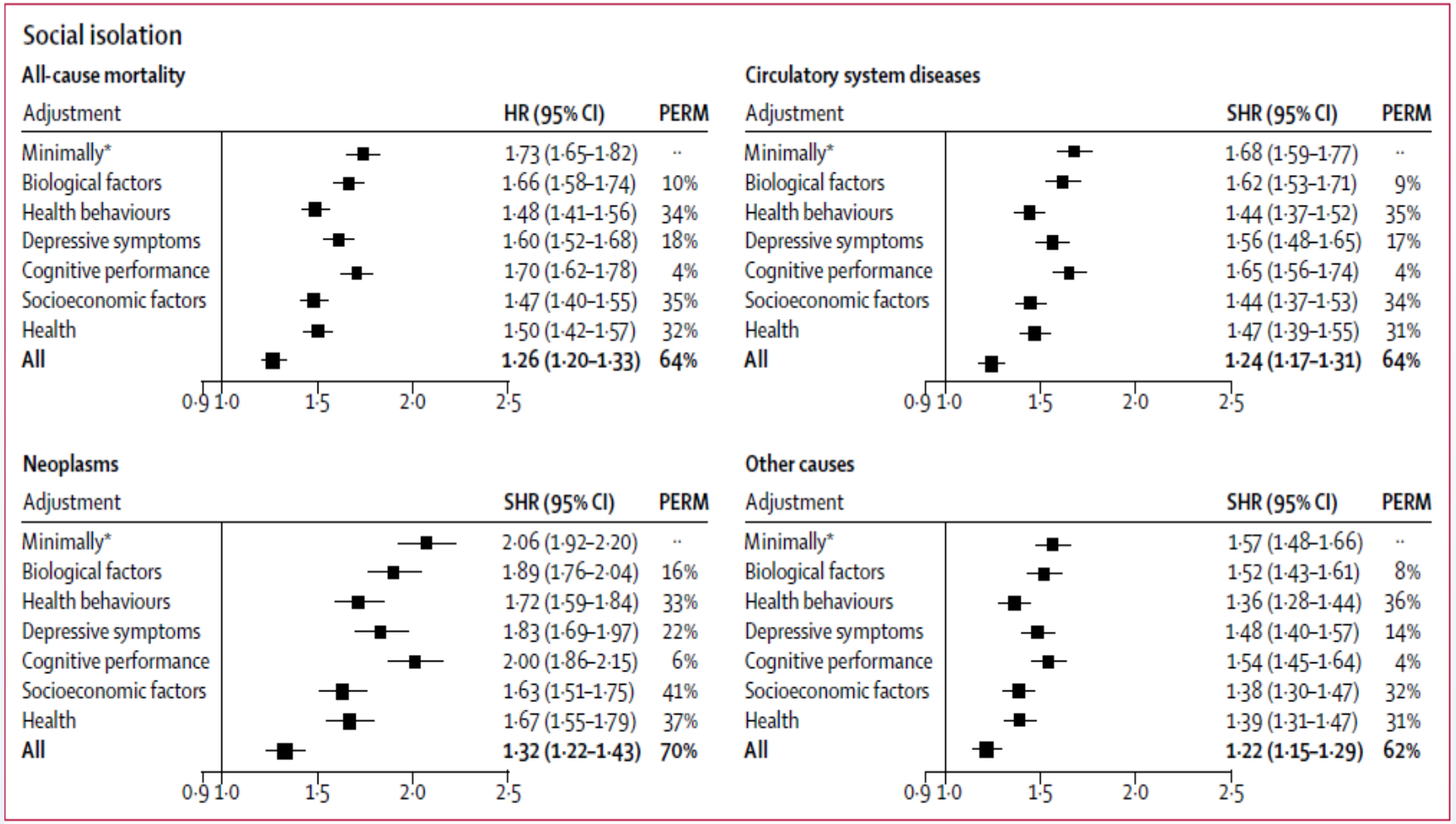


Figure 1: Proportions of the social isolation–mortality association attributable to biological, behavioural, and psychological factors
HR=hazard ratio. PERM=percentage of excess risk mediated. SHR=sub-hazard ratio. *Adjusted for age, sex, ethnic origin, and chronic disease.

Elovaninio et al. Lancet 2017

Mediation in loneliness → mortality

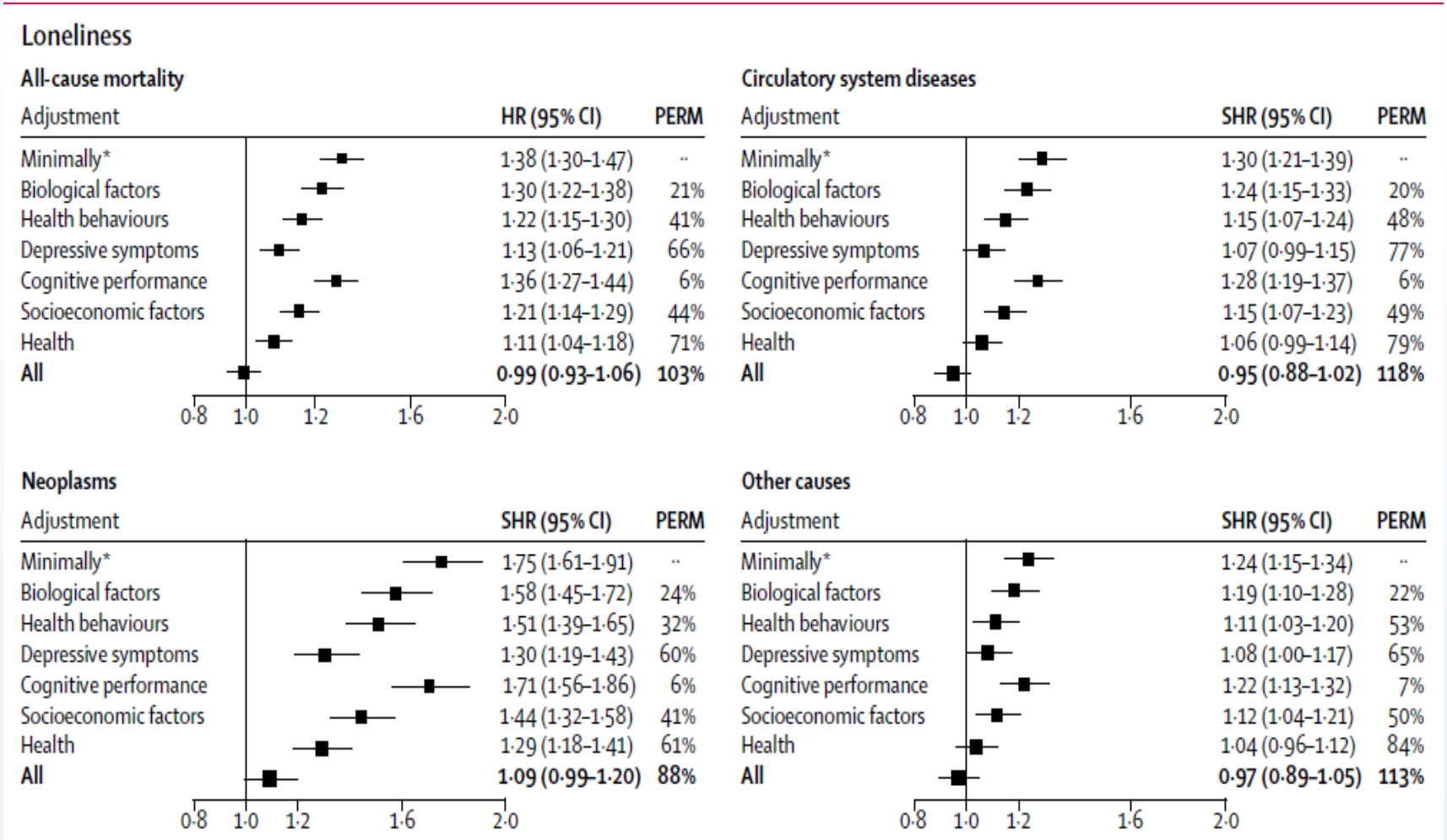
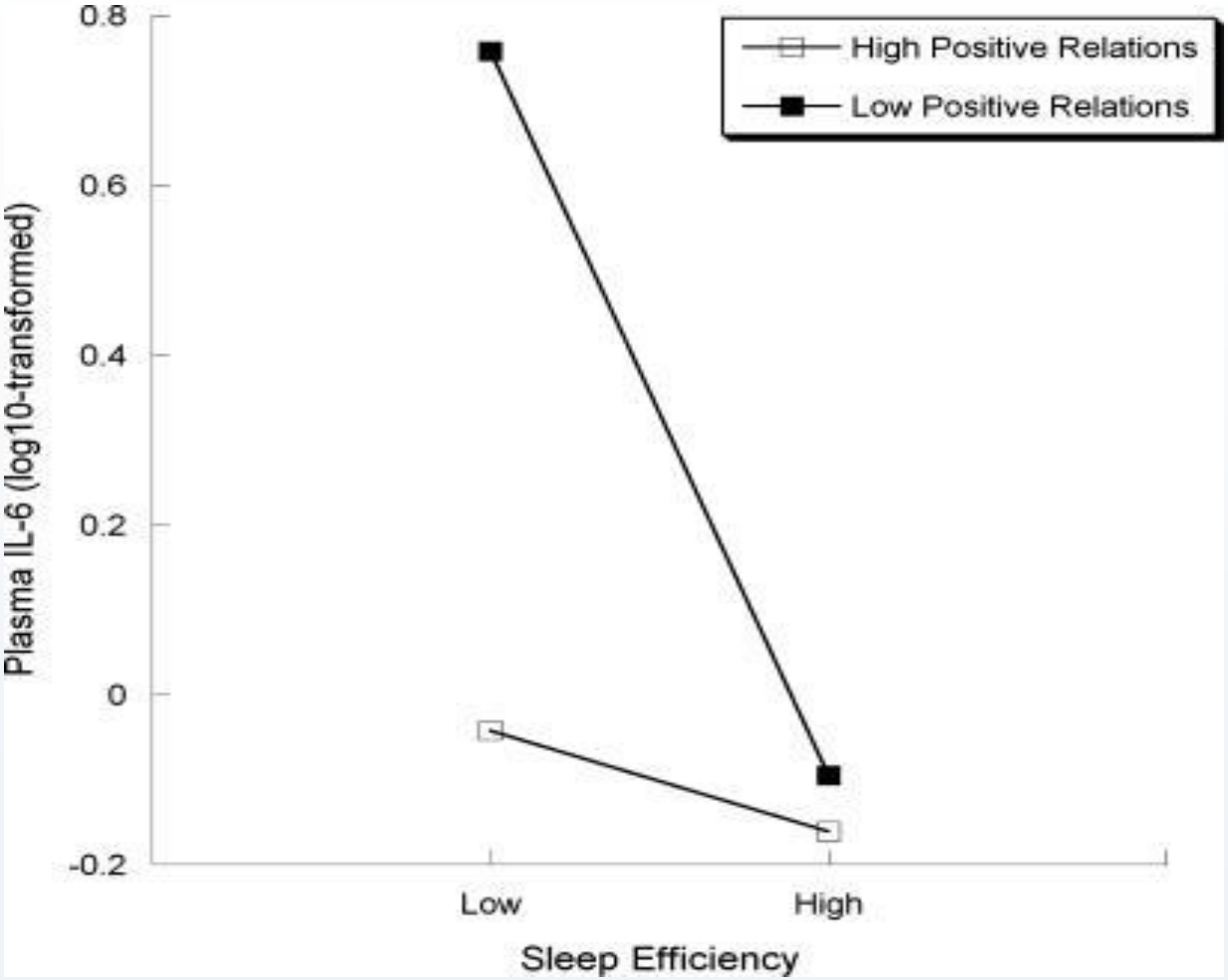


Figure 2: Proportions of the loneliness–mortality association attributable to biological, behavioural, and psychological factors

HR=hazard ratio. PERM=percentage of excess risk mediated. SHR=sub-hazard ratio. *Adjusted for age, sex, ethnic origin, and chronic disease.

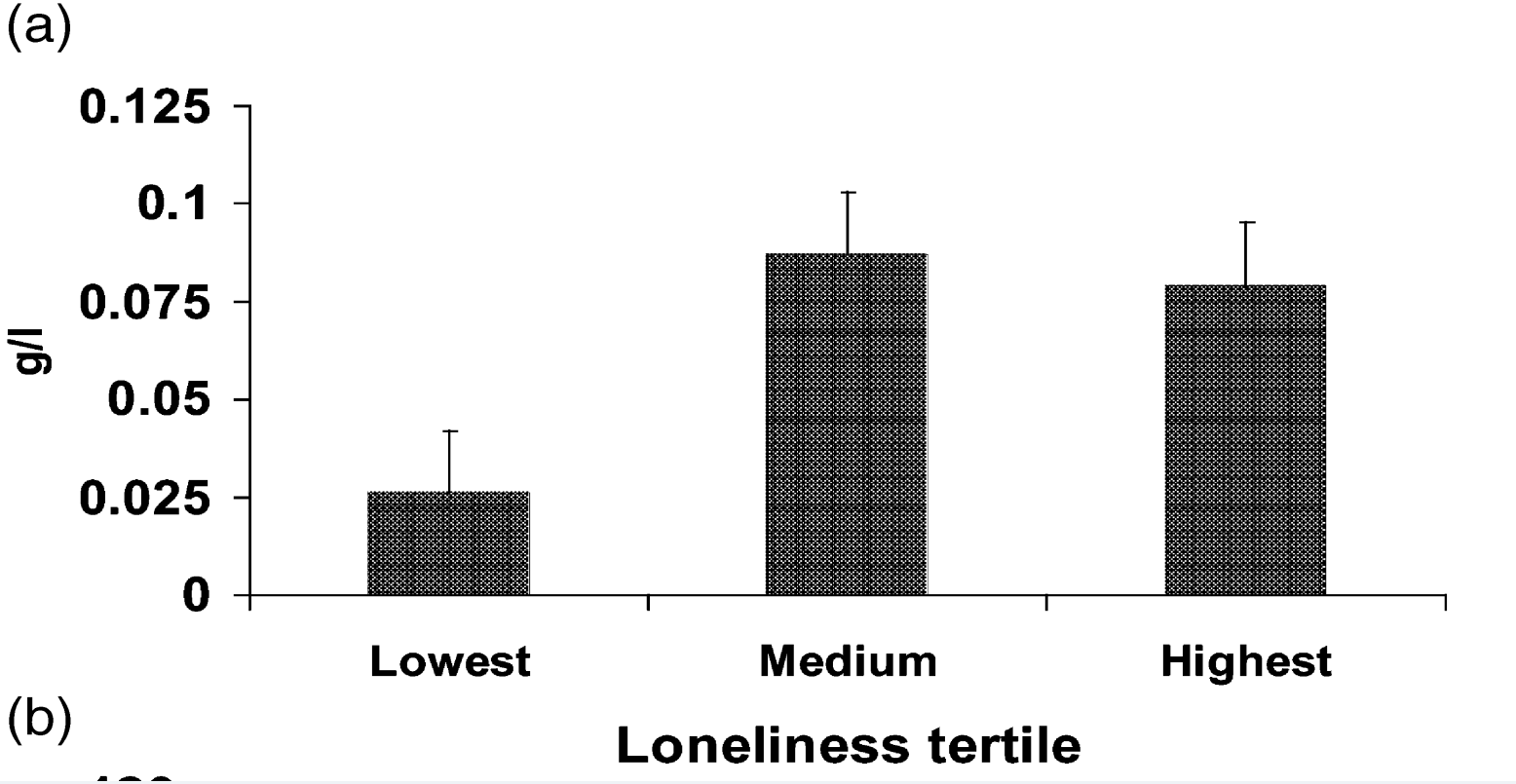
Elovaninio et al. Lancet 2017

Positive relations as buffer against stress.



Source: Friedman et al. PNAS 2005

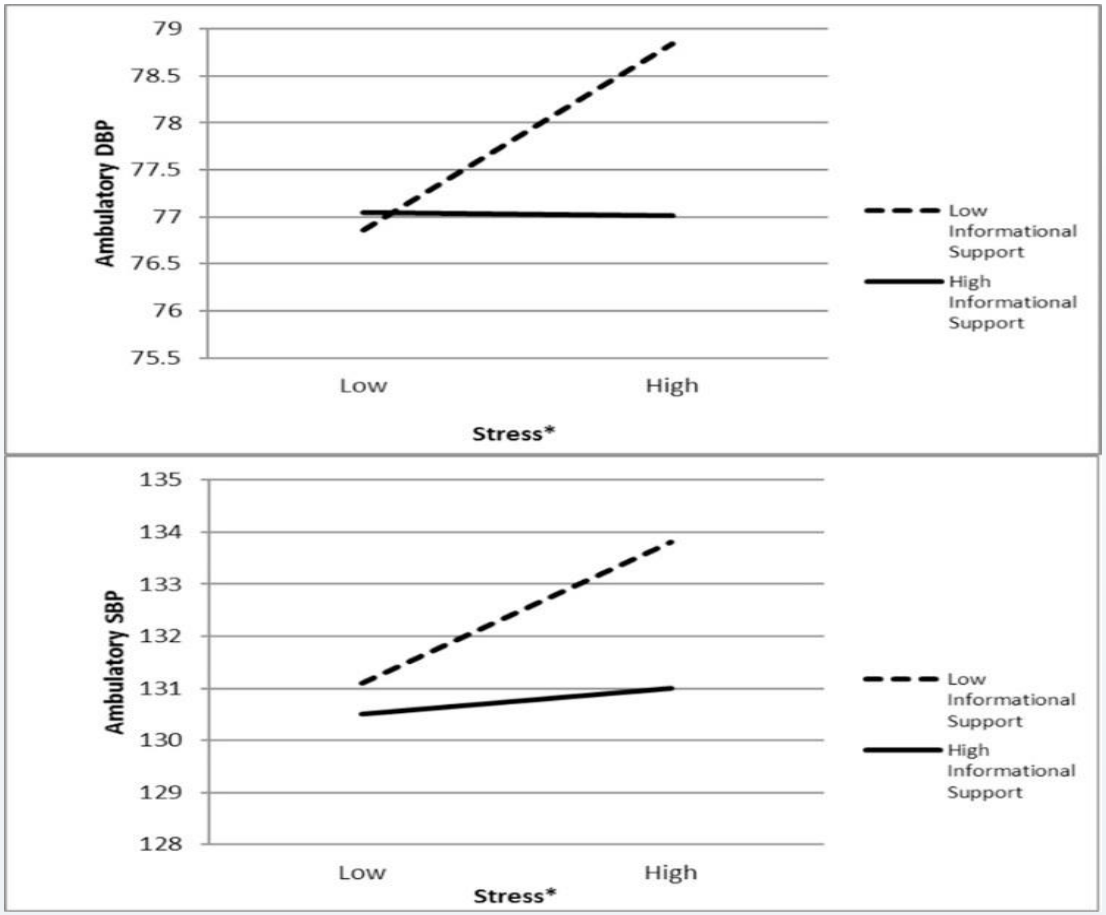
Mean changes in plasma fibrinogen between baseline and stress blood samples by tertiles of loneliness.



Source: Steptoe et al. PNEC 2004

Adjusted for sex, grade of employment, smoking, control at work.

Does social support moderate associations between stress and BP?



Age, gender, household income, body mass, posture, activity level, a prior meal and time (e.g., first, second reading)

Source: Bowen et al. Health Psychol 2014

Gender & Social Relationships

- Women have larger social networks, more social support.
- Women's greater social integration may contribute to their greater longevity.
- Marriage is more important as a source of support for men.
  - Men gain the benefits of marriage without the cost of domestic & caregiving responsibilities.
- Will weakening gender norms and changing nature of partnerships – women no longer economically dependent on marriage -- reverse findings above?
  - Some evidence for 'yes' (Rogers et al. 2010; Stohschein et al. 2005; Uecker 2013; Umberson & Williams 2005; Williams 2003)

Gender & Social Relationships

- Why are social relationships more important for women than men?
  - Evolutionary perspective: Women had responsibility for care of immature offspring – greater need than men to be able to turn to social group for protection in times of threat.
  - Sociological perspective: Gender norms & social institutions structure and legitimate competitiveness amongst boys and intimacy & nurturing amongst girls.

- Are women more 'reactive' to their relationships? **Perhaps psychologically, but not physically**.
  - Associations stronger for mental health
  - But not CVD, mortality or cognitive outcomes.
  - For inflammation may be stronger for men

Social networks are associated with fibrinogen concentration in elderly men.

TABLE 3. Odds Ratios (OR) and R^2 Values for Elevated Fibrinogen Concentrations (in the Highest Concentration Quartile >336 mg/dl) According to Social Network (SN) Quartile

	Model 1				Model 2				Model 3			
	OR	95% CI	*p*	R^2	OR	95% CI	*p*	R^2	OR	95% CI	*p*	R^2
SN Quartile, Men												
4 (high; *n* = 122)	1.0			0.03	1.0			0.06	1.0			0.12
3 (*n* = 87)	1.70	0.86–3.36	.12		1.73	0.86–3.47	.12		1.68	0.81–3.46	.16	
2 (*n* = 92)	2.09	1.08–4.02	.03		2.31	1.16–4.63	.02		2.25	1.09–4.69	.03	
1 (low; *n* = 74)	2.40	1.21–4.75	.01		2.61	1.26–5.42	.01		2.29	1.07–4.89	.03	
SN Quartile, Women												
4 (high; *n* = 121)	1.0			0.01	1.0			0.05	1.0			0.10
3 (*n* = 104)	1.07	0.59–1.93	.83		1.10	0.60–2.07	.72		0.97	0.51–1.83	.92	
2 (*n* = 118)	1.11	0.63–1.97	.79		1.14	0.63–2.07	.67		1.10	0.59–2.06	.76	
1 (low; *n* = 82)	0.78	0.40–1.50	.31		0.67	0.33–1.36	.26		0.57	0.27–1.21	.15	

CI = confidence interval; SN = social networks.
Model 1, no adjustment; Model 2, adjusted for age, race, education, co-morbidity, and physical functioning; Model 3, adjusted for age, race, education, co-morbidity, physical functioning, depression, smoking, alcohol consumption, physical activity, body mass index and depression.

Loucks, Eric; Berkman, Lisa; Gruenewald, Tara; Seeman, Teresa Psychosomatic Medicine. 67(3):353-358, May/June 2005.

Social networks are associated with C-Reactive Protein concentration in elderly men.

Odds ratios for elevated C-reactive protein (CRP) concentrations (in highest concentration quartile >3.19 mg/L) according to social network quartile in MacArthur Successful Aging Study, 1988–1989

	Model Adjustment					
	Unadjusted		Age and Race/Ethnicity		Clinical Risk Factors	
	OR	95% CI	OR	95% CI	OR	95% CI
Social network level, men						
4 (high, n = 124)	1.00		1.00		1.00	
3 (n = 88)	1.74	0.90–3.36	1.91	0.97–3.76	1.46	0.71–2.99
2 (n = 93)	1.70	0.89–3.27	2.18*	1.09–4.34	1.57	0.75–3.29
1 (low, n = 75)	2.18*	1.17–4.42	2.90*	1.41–5.96	2.23*	1.05–4.76
Social network level, women						
4 (high, n = 121)	1.00		1.00		1.00	
3 (n = 104)	1.17	0.63–2.14	1.28	0.69–2.38	1.21	0.62–2.37
2 (n = 118)	0.99	0.54–1.80	1.06	0.58–1.96	1.22	0.62–2.38
1 (low, n = 82)	1.00	0.52–1.95	1.13	0.56–2.20	0.93	0.43–1.99

Clinical risk factors included age, race/ethnicity, socioeconomic status, cardiovascular disease, other major/chronic conditions (diabetes, high blood pressure, cancer, and broken bones), physical functioning, smoking, alcohol consumption, physical activity, body mass index, and depression.

* Statistically significant ($p < 0.05$).

Source: Loucks et al. Am J Cardiol 2006

Social networks and C-Reactive Protein in the NHANES.

	Social network index			
	4: most ties	3	2	0, 1: fewest ties
	OR	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age 20–59 years (N = 4649)				
Model 1[a]	1.00	0.93 (0.57–1.52)	1.18 (0.84–1.66)	1.20 (0.79–1.81)
Model 2[b]	1.00	0.86 (0.53–1.40)	0.96 (0.67–1.38)	0.93 (0.62–1.39)
Age ≥60 years (N = 2323)				
Model 1[a]	1.00	1.37 (0.88–2.13)	1.74 (1.19–2.55)	2.09 (1.37–3.21)
Model 2[b]	1.00	1.29 (0.83–2.03)	1.54 (1.04–2.28)	1.80 (1.11–2.92)

OR = odds ratio; CI = confidence interval.
[a]Model 1 adjusted for age and race or ethnicity.
[b]Model 2 adjusted for age, race or ethnicity, education, smoking status, alcohol use, physical activity, body mass index, hypertension, total cholesterol concentration, and self-reported diabetes mellitus.

Men

	Social network index			
	4: most ties	3	2	0, 1: fewest ties
	OR	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age 20–59 years (N = 5423)				
Model 1[a]	1.00	1.06 (0.80–1.39)	1.03 (0.80–1.34)	1.38 (1.04–1.85)
Model 2[b]	1.00	1.05 (0.75–1.47)	0.88 (0.65–1.21)	1.22 (0.85–1.76)
Age ≥60 years (N = 2423)				
Model 1[a]	1.00	1.12 (0.81–1.56)	1.17 (0.78–1.77)	1.15 (0.74–1.79)
Model 2[b]	1.00	1.06 (0.75–1.49)	1.00 (0.66–1.50)	0.91 (0.57–1.46)

OR = odds ratio; CI = confidence interval.
[a]Model 1 adjusted for age and race or ethnicity.
[b]Model 2 adjusted for age, race or ethnicity, education, smoking status, alcohol use, physical activity, body mass index, hypertension, total cholesterol concentration, and self-reported diabetes mellitus.

Women

Source: Ford et al. Ann Epidemiol 2006

SUMMARY: Social relationships & biology

MAIN EFFECTS:

- Structural aspects association with inflammation and blood pressure, adiposity for younger people?
- Loneliness effects attenuated by depressive symptoms (physical health).

BUFFER EFFECTS: Some evidence that inflammatory and blood pressure responses to stress greater for those with fewer social ties, less support or greater loneliness.

GENDER DIFFERENCES: Some evidence of higher inflammation for those with fewer social ties for men but not women.