Healthy minds for Future Generations

Promoting Dementia Risk Reduction

Predictors of disease, dementia and 'well being' in Caerphilly

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Division of Population Medicine, Cardiff University

All Nations Centre, Cardiff. 14th December 2017

Predictors of disease, dementia and 'well being' in the Caerphilly Cohort Study

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Predictors of disease, dementia and ‘well being’ in the Caerphilly Cohort Study

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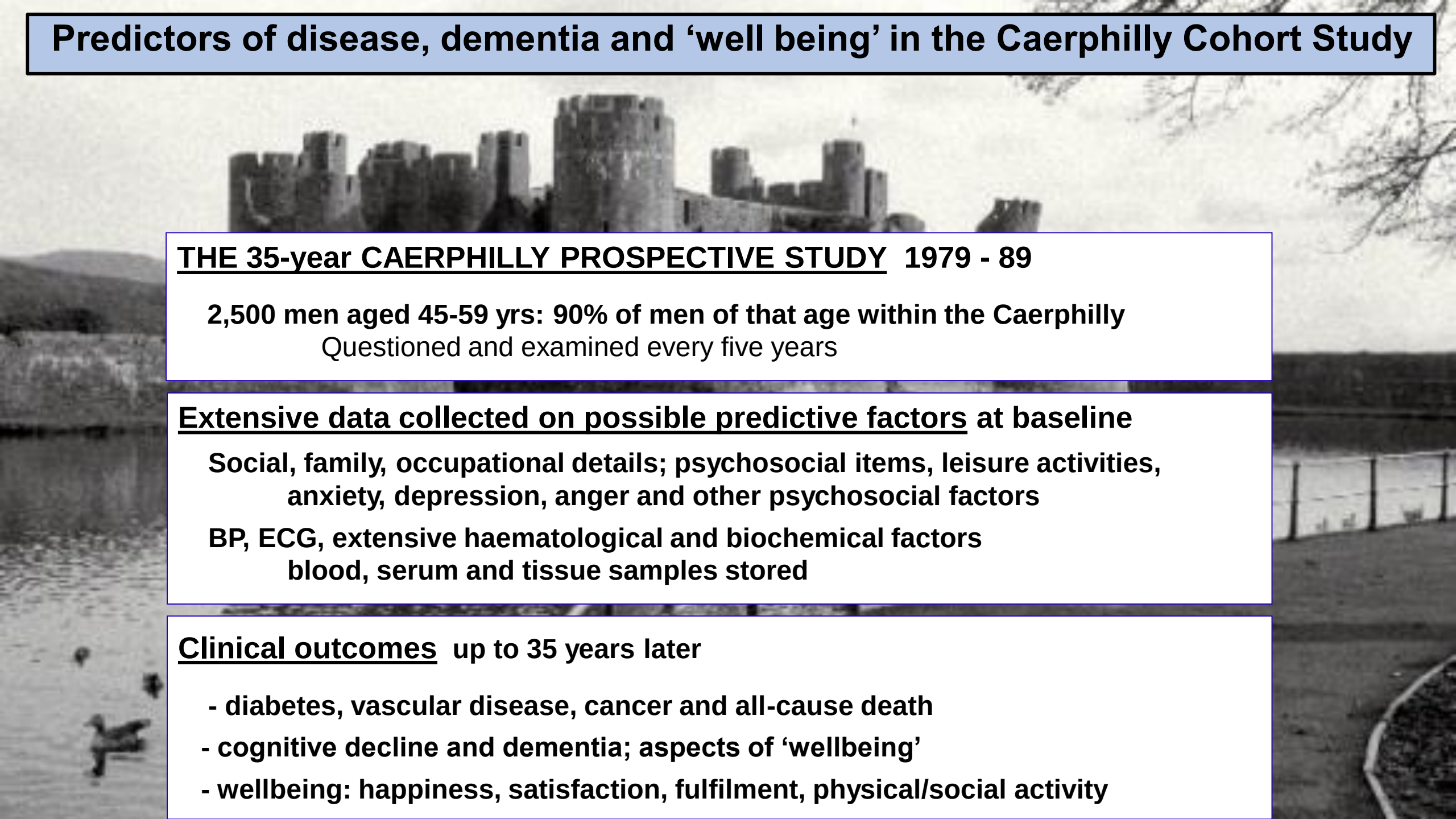


THE 35-year CAERPHILLY PROSPECTIVE STUDY 1979 - 89

2,500 men aged 45-59 yrs: 90% of men of that age within the Caerphilly
Questioned and examined every five years

Extensive data collected on possible predictive factors at baseline

Social, family, occupational details; psychosocial items, leisure activities, anxiety, depression, anger and other psychosocial factors

BP, ECG, extensive haematological and biochemical factors
blood, serum and tissue samples stored

Clinical outcomes up to 35 years later

- diabetes, vascular disease, cancer and all-cause death

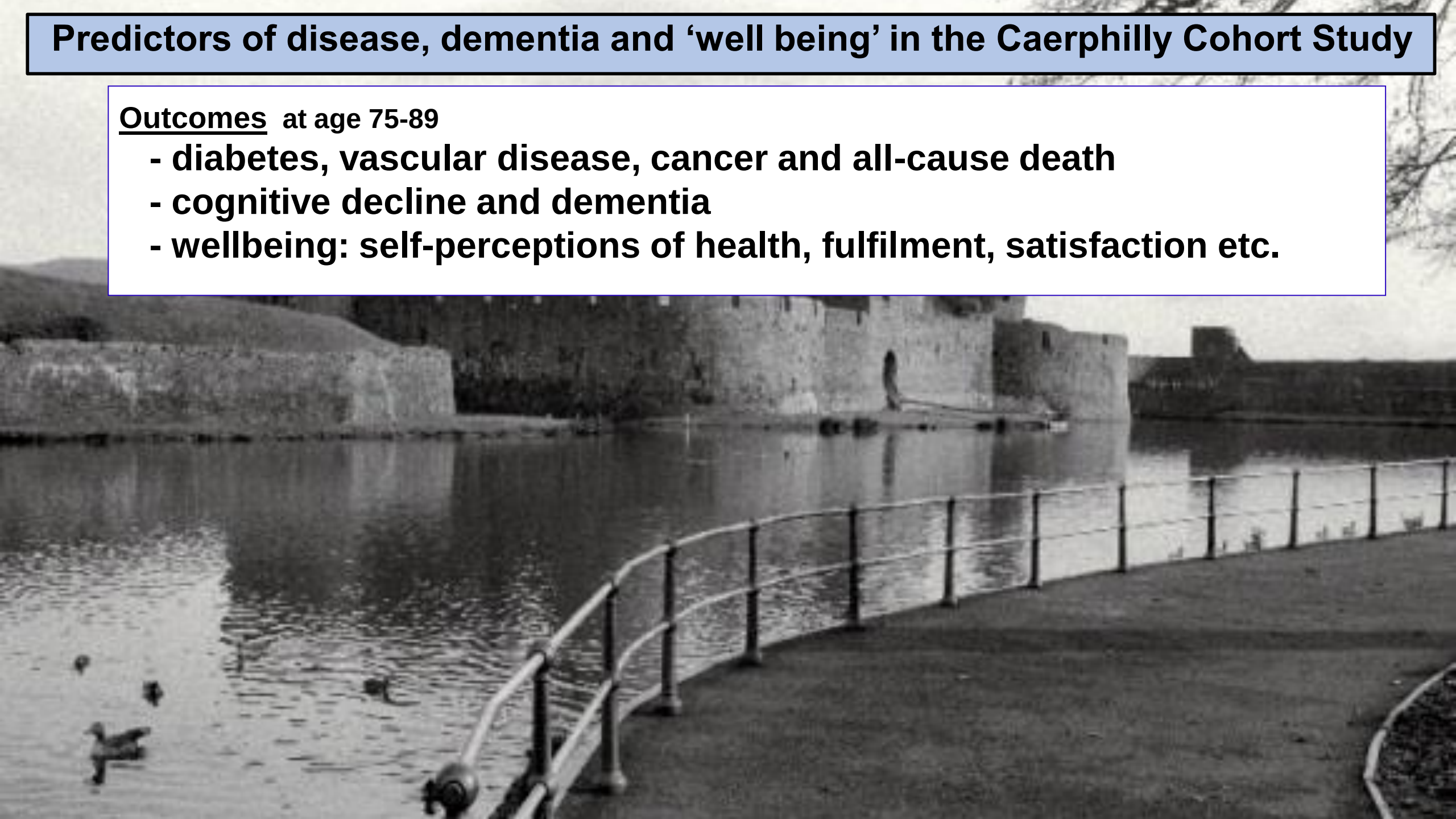
- cognitive decline and dementia; aspects of ‘wellbeing’

- wellbeing: happiness, satisfaction, fulfilment, physical/social activity

Predictors of disease, dementia and ‘well being’ in the Caerphilly Cohort Study

Outcomes at age 75-89

- diabetes, vascular disease, cancer and all-cause death
- cognitive decline and dementia
- wellbeing: self-perceptions of health, fulfilment, satisfaction etc.



Predictors of disease, dementia and 'well being' in the Caerphilly Cohort Study

Outcomes **at age 75-89**

- **diabetes, vascular disease, cancer and all-cause death**
- **cognitive decline and dementia**
- **wellbeing: self-perceptions of health, fulfilment, satisfaction etc.**

Predictive factors **20-30 years previously**

- Social factors and contacts: marriage, family size, social class etc.
- Lifestyle: smoking, exercise, diet, BMI, alcohol
- Baseline mood: GHQ, depression, anxiety
- Auditory Threshold
- Disturbed sleep:
- Leisure and social activities: 'intellectual', physical, social
- Vascular disease:
- 'Sticky blood':
- inflammatory markers
- Head injury
- proximity of green places

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Predictive factors 20-30 years previously

- Social factors and contacts: marriage, family size, social class etc.
- **Lifestyle: Non-smoking**
- Baseline m **Maintenance of a low BMI**
- Auditory Th **Regular physical exercise**
- Disturbed s **A 'healthy' diet**
- Leisure and **A low alcohol intake**
- Vascular disease:
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An 'Unhealthy' lifestyle
None or only one behaviour

A 'Healthy' lifestyle
Four or five of the behaviours

Predictors of disease in the Caerphilly Cohort Study

Reductions in chronic diseases

HEALTHY LIFESTYLE (consistent)	Diabetes (214 men)	Vascular disease (752 men)	Cancer (648 men)	Cognitive decline (299 men)	Dementia (121 men)
'Unhealthy' (None or one behaviour)	100	100	100	100	100
'Healthy' (Four or five behaviours)	-72%	-67%	-35%	-56%	--65%
Significance of trend	*0.001*	*0.0005*	*0.88*	*0.001*	*0.006*

All relationships adjusted for age, social class and other confounding factors

Healthy Lifestyles Reduce the Incidence of Chronic Diseases and Dementia: Evidence from the Caerphilly Cohort Study. Elwood, Galante, Pickering, Palmer, Bayer, Ben Shlomo, Longley, Gallacher. 2013. https://doi.org/10.1371/journal.pone.0081877

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OTHER BENEFITS OF A HEALTHY LIFESTYLE:

Delays in the onset of disease

- *vascular disease events delayed by an average of 13 years*
- *death delayed by an average of 6 years*

More men retire disease free

- *10% of subjects who had neglected healthy living*
- *23% of those who had followed a healthy lifestyle*

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OTHER BENEFITS OF A HEALTHY LIFESTYLE:

Disease burden in the community reduced

- if the subjects in the Caerphilly cohort had each been urged to take up one additional healthy behaviour…. and If only half had done so, there would have been, over the next 30 years…..

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12% less diabetes

6% less vascular disease

13% less dementia

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Predictors of disease in the Caerphilly Cohort Study

Reductions					
LIFESTYLE	**Diabetes** (214 men)	**Vascular disease** (752 men)	**Cancer** (648 men)	**Cognitive decline** (299 men)	**Dementia** (121 men)
Non-smoking **Low BMI** **Regular exercise** **'healthy' diet** **Low alcohol**	*-72%*	*-67%*	*-35 %*	*-56%*	*-65%*

Is this just the performance of a few behaviours
…..or is it a 'marker' for a type of person?

….is there a 'Glasgow' effect'?

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Predictors of disease in the Caerphilly Cohort Study

Healthy living, disease and social class

Reductions during 35-year follow-up

	Diabetes		Vascular disease		All cause mortality	
LIFESTYLE	Non-M	Manual	Non-M	Manual	Non-M	Manual
REDUCTIONS by a 'HEALTHY' LIFESTYLE						

All estimates adjusted for age

Predictors of disease in the Caerphilly Cohort Study

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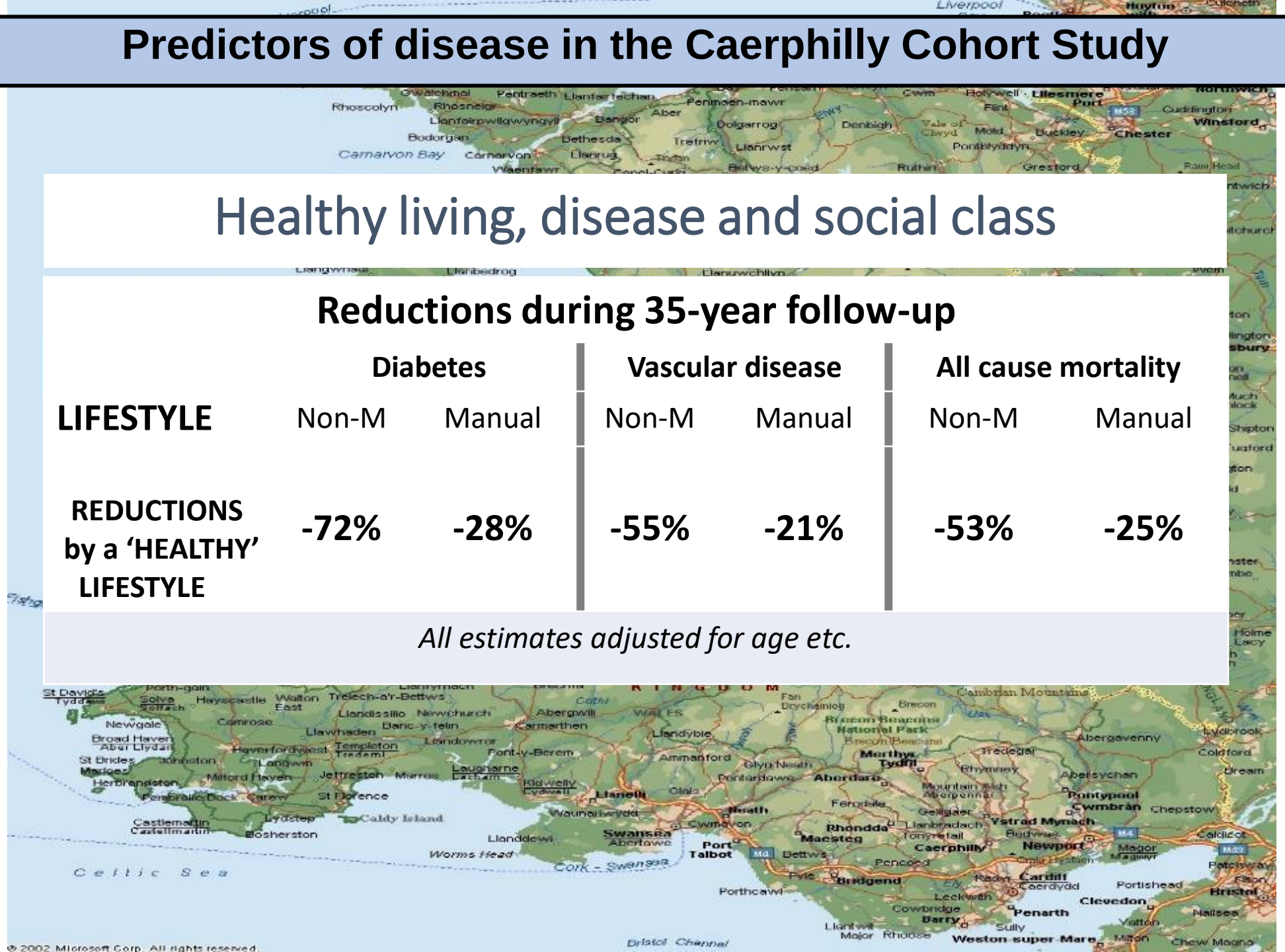
Reductions during 35-year follow-up

	Diabetes		Vascular disease		All cause mortality	
LIFESTYLE	Non-M	Manual	Non-M	Manual	Non-M	Manual
REDUCTIONS by a 'HEALTHY' LIFESTYLE	**-72%**	**-28%**	**-55%**	**-21%**	**-53%**	**-25%**

All estimates adjusted for age etc.



Predictors of disease in the Caerphilly Cohort Study

BEHAVIOUR	REDUCTIONS			
	Diabetes	Vascular disease	Cancer	Deaths
Non-smoking				
BMI < 25				
'Healthy' diet				
Regular activity				
Low alcohol				

Data from the Caerphilly cohort are available.

Data for cancer have been derived from 1/3Million subjects and 14,285 cancers in UK Biobank.

See Elwood et al: Healthy living and cancer: evidence from Biobank in eCancer

Predictors of disease in the Caerphilly Cohort Study

BEHAVIOUR	REDUCTIONS			
	Diabetes	Vascular disease	Cancer	Deaths
Non-smoking	±	++	+++	++
BMI < 25	+++	++	+	+
'Healthy' diet	±	±	±	±
Regular activity	++	±	+	+
Low alcohol	±	±	+	±

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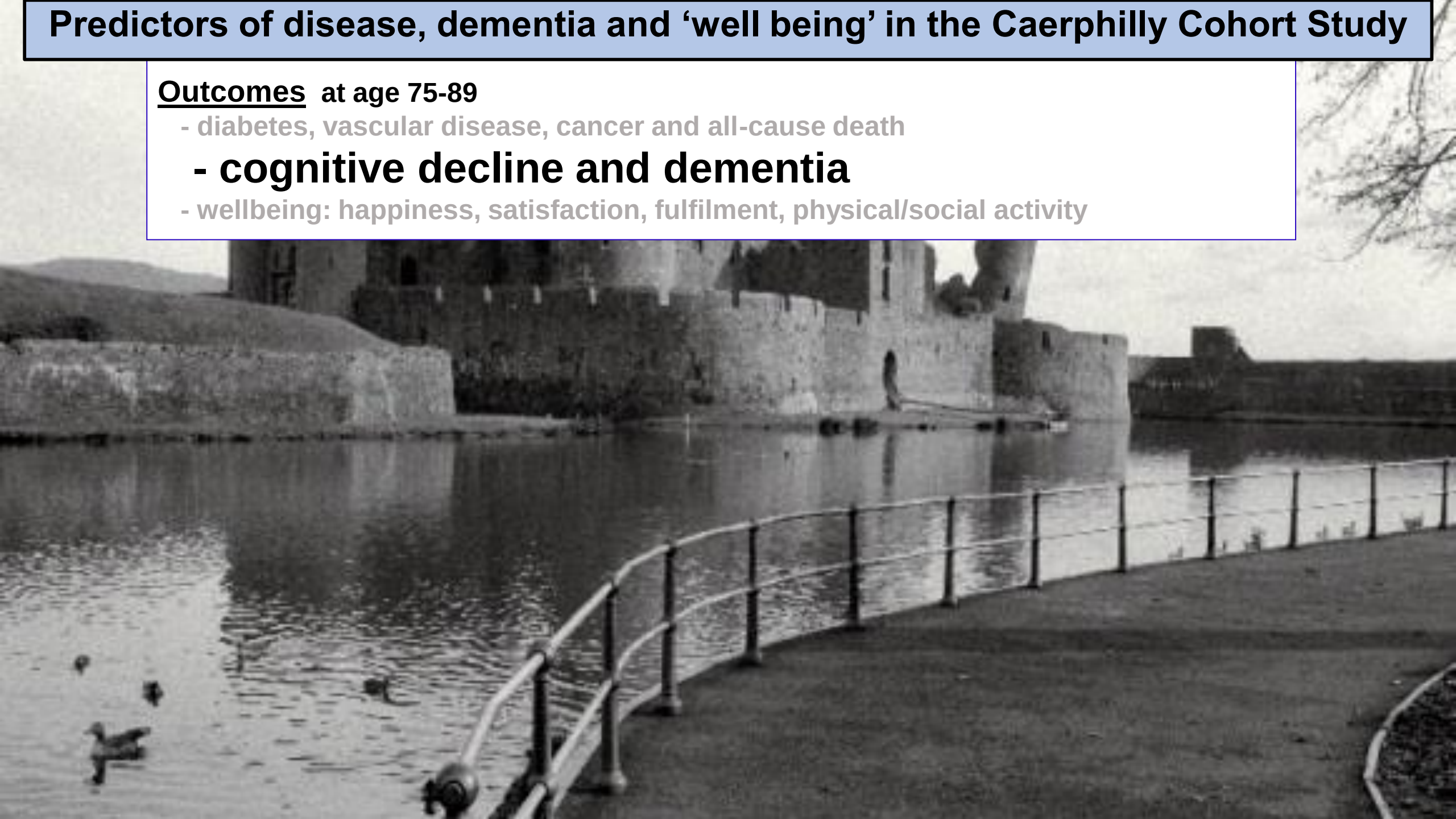

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Predictive factors **20-30 years previously**

- Social factors and contacts: marriage, family size, social class etc.
- Lifestyle:
- Baseline mood: GHQ, depression, anxiety
- Auditory Threshold
- Disturbed sleep:
- Leisure and social activities: 'intellectual', physical, social
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- 'Sticky blood':
- inflammatory markers
- Head injury
- green places

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OTHER BENEFITS OF A HEALTHY LIFESTYLE:

Delays in the onset of dementia

- dementia delayed by an average of 6 years

Disease burden in the community reduced

- if the subjects in the Caerphilly cohort had each been urged to take up one additional healthy behaviour…. and If only half had done so, there would have been, over the next 30 years…..

13% less dementia

Predictors of dementia in the Caerphilly Cohort Study

Healthy living, dementia and social class

	Cognitive impairment		Dementia	
	Non manual	Manual	Non manual	Manual
Incidence	14%	36%	8%	15%

All results adjusted for age and for base-line NART

Predictors of dementia in the Caerphilly Cohort Study

Dementia, healthy living and social class

LIFESTYLE	Cognitive impairment		Dementia	
	Non manual	Manual	Non manual	Manual
Incidence	14%	36%	8%	15%
REDUCTIONS HEALTHY LIFESTYLE	**-60%**	**-54%**	**-65%**	**-59%**

All results adjusted for age and for base-line NART

Predictors of dementia in the Caerphilly Cohort Study

Outcomes **at age 75-89**

- diabetes, vascular disease, cancer and all-cause death
- **cognitive decline and dementia**
- wellbeing: happiness, satisfaction, fulfilment, physical/social activity

Predictive factors 20-30 years previously

- Social factors and contacts: marriage, family size, social class etc.
- Lifestyle: smoking, exercise
- Baseline mood: GHQ, depression, anxiety
- Auditory Threshold
- Disturbed sleep:
- Leisure and social activities: 'intellectual', 'physical', 'social'
- Vascular disease:
- 'Sticky blood':
- inflammatory markers
- Head injury
- green places

Predictors of dementia in the Caerphilly Cohort Study

Chronic disease and Dementia 15-20 years later

diabetes	**13.6%**	vs	9.1% in subjects with no diabetes
vascular disease	**17.0%**	vs	7.5% in subjects with no vasc. disease
hypertension	**13.6%**	vs	7.8% in normotensive subjects

Vascular disease and cognitive function in oolder men in the Caerphilly cohort. Age and Ageing 2001;31:43-6.

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1. **The risk of dementia is increased by about 50% in men with diabetes[1]**
2. **Almost 70% of new diabetes is attributable to overweight[1]**
3. **In diabetes, good control of blood glucose reduces the risk of cognitive loss[2]**
4. Primary care-led intensive weight management led to remission in 50 % of patients[3]

1. Vascular disease and cognitive function in older men in the Caerphilly cohort. Age and Ageing 2001;31:43-6.
2. Glucoregulation has greater impact on cognitive performance than macro-vascular disease in men with type 2 diabetes: data from the Caerphilly study. Gallacher et al. Eur J Epidemiol 2005;20:761-8
3. Primary care-led weight management for remission of Type 2 diabetes Lancet Dec 5.2017

Predictors of dementia in the Caerphilly Cohort Study

Auditory threshold at baseline and dementia 15-20 years later

Baseline auditory threshold assessed at 4 frequencies, twice at a 10 year interval

.

Risk of dementia in men with baseline auditory threshold above median:

OR 2.67 (1.38, 5.18) after adjustments for possible confounding

Further analyses suggested that the relationship was for non-vascular dementia **OR 2.23** (1.04, 4.77)

Auditory threshold, phonologic demand and incident dementia. Neurology 2012;79(15):1583-90

Predictors of dementia in the Caerphilly Cohort Study

Disturbed sleep at baseline and dementia 15-20 years later

20% of the men reported ‘disturbed’ sleep at base-line

OR for vascular dementia 2.04 (1.05, 3.98)

30% complained of ‘severe’ daytime sleepiness at base-line

OR for vascular dementia 4.4 (2.05, 9.61)

No relationships detected with non-vascular dementia

Sleep disturbance and daytime sleepiness predict vascular dementia.
J Epidemiol Com Hlth. 2011;65:820-4.

Predictors of dementia in the Caerphilly Cohort Study

Blood rheology, cognitive loss and dementia 15-20 years later

Haematocrit: sig. reduction in cognitive function at highest levels *P<0.05*

Plasma viscosity: sig reduction at highest levels *P<0.05*

Cognitive function and blood rheology: results from the Caerphilly cohort of older men. Age and Ageing 2001;30:135-9.

Predictors of dementia in the Caerphilly Cohort Study

Haemostatic and inflammatory indices and dementia

On the basis of an analysis of 15 haemostatic tests:

'… the coagulation pathways of clotting activity….. increase the risk of vascular dementia……' [2.3]

On the basis of an analysis of six inflammatory tests:

No significant association with inflammatory markers[2]

2. Cognitive function and blood rheology: results from the Caerphilly cohort of older men. Age and Ageing 2001;30:135-9.

2. Is sticky blood bad for the brain? Arterioscler Thomb Vasc Biol 2010;30:599-604

3. Editorial: Is sticky blood a treatable determinant of cognitive decline and of dementia. Age and Ageing 2001;30:101-3

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'… the coagulation pathways of … the risk of vascular dementi… of vascular deme…

…roinfarct model

On the basi… …matory tests:

…with inflammatory markers[2]

'Sticky blood' and dementia: '…a testable hypothesis!'[3]

Gordon Lowe, Haematologist, University of Glasgow

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Predictors of wellbeing in the Caerphilly Cohort Study

Outcomes **at age 75-89**

- diabetes, vascular disease, cancer and all-cause death
- cognitive decline and dementia
- **‘wellbeing’:**

Predictors of wellbeing in the Caerphilly Cohort Study

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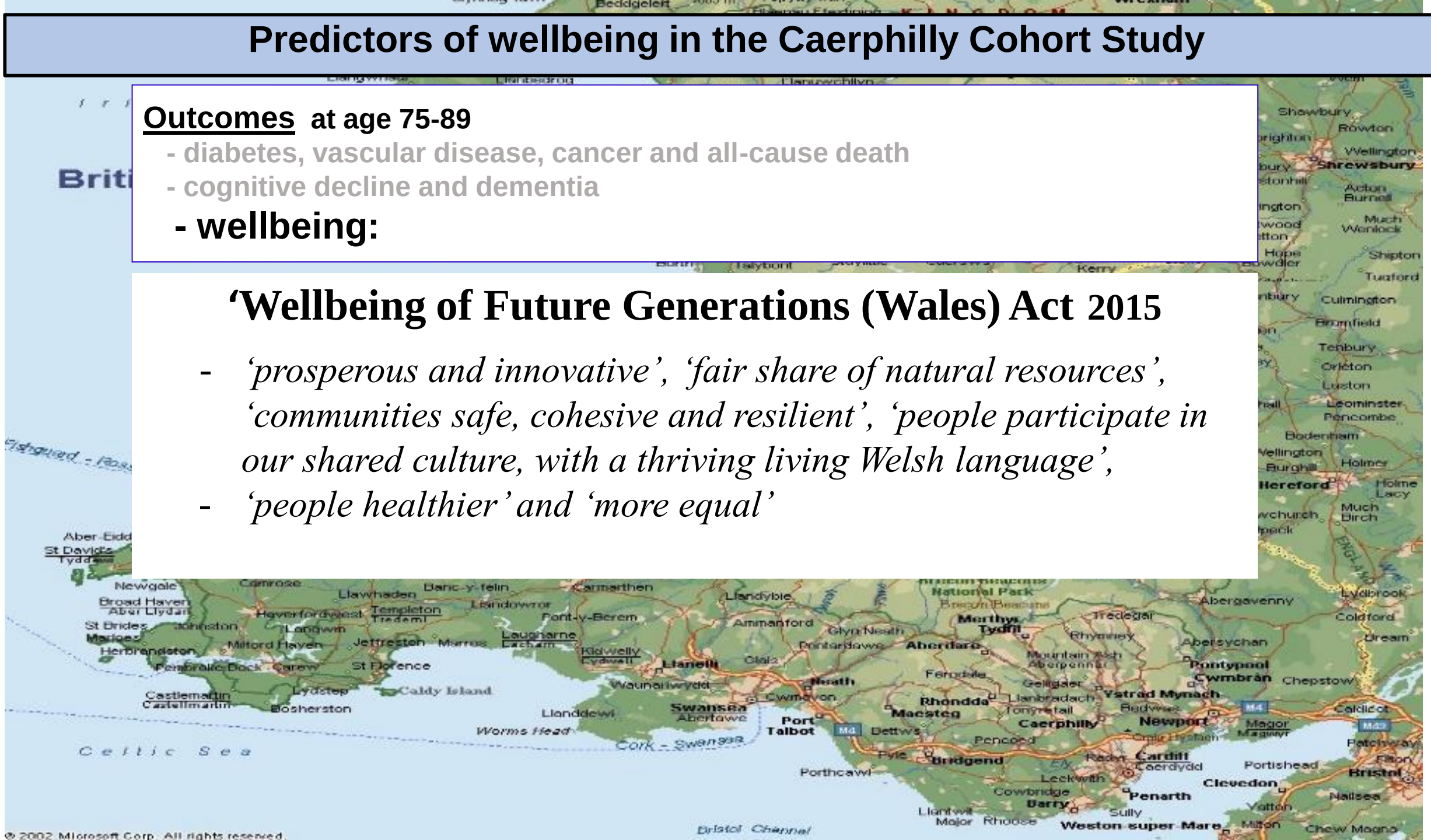
- diabetes, vascular disease, cancer and all-cause death
- cognitive decline and dementia
- **wellbeing:**

'Wellbeing of Future Generations (Wales) Act 2015

- *'prosperous and innovative', 'fair share of natural resources', 'communities safe, cohesive and resilient', 'people participate in our shared culture, with a thriving living Welsh language',*
- *'people healthier' and 'more equal'*



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- diabetes, vascular disease, cancer and all-cause death
- cognitive decline and dementia
- **wellbeing:**

Older People's Commissioner for Wales

'Wellbeing indicators for older people'

1. **<u>What is well being</u>?**

   - *Feel safe, listened to, valued and respected*
   - *Able to get the help they need, when and in a way they want it*
   - *Live in a place that suits them and their lives*
   - *Are able to do the things that matter to them*

Predictors of wellbeing in the Caerphilly Cohort Study

Outcomes **at age 75-89**

- diabetes, vascular disease, cancer and all-cause death
- cognitive decline and dementia
- **wellbeing:** **self-perception** **of health, fulfilment, satisfaction etc.**

There is a large psychological literature….

'WELLBEING'

general health	*GHQ, ADL*
cognitive function	*AH4, MMSE*
social support	*Diener et al 1985*
self esteem	*Kupens et al 2008*
satisfaction with life	*Diener et al 1985*
mood/affect	*anxiety/depression etc*
inequalities	

Predictors of wellbeing in the Caerphilly Cohort Study

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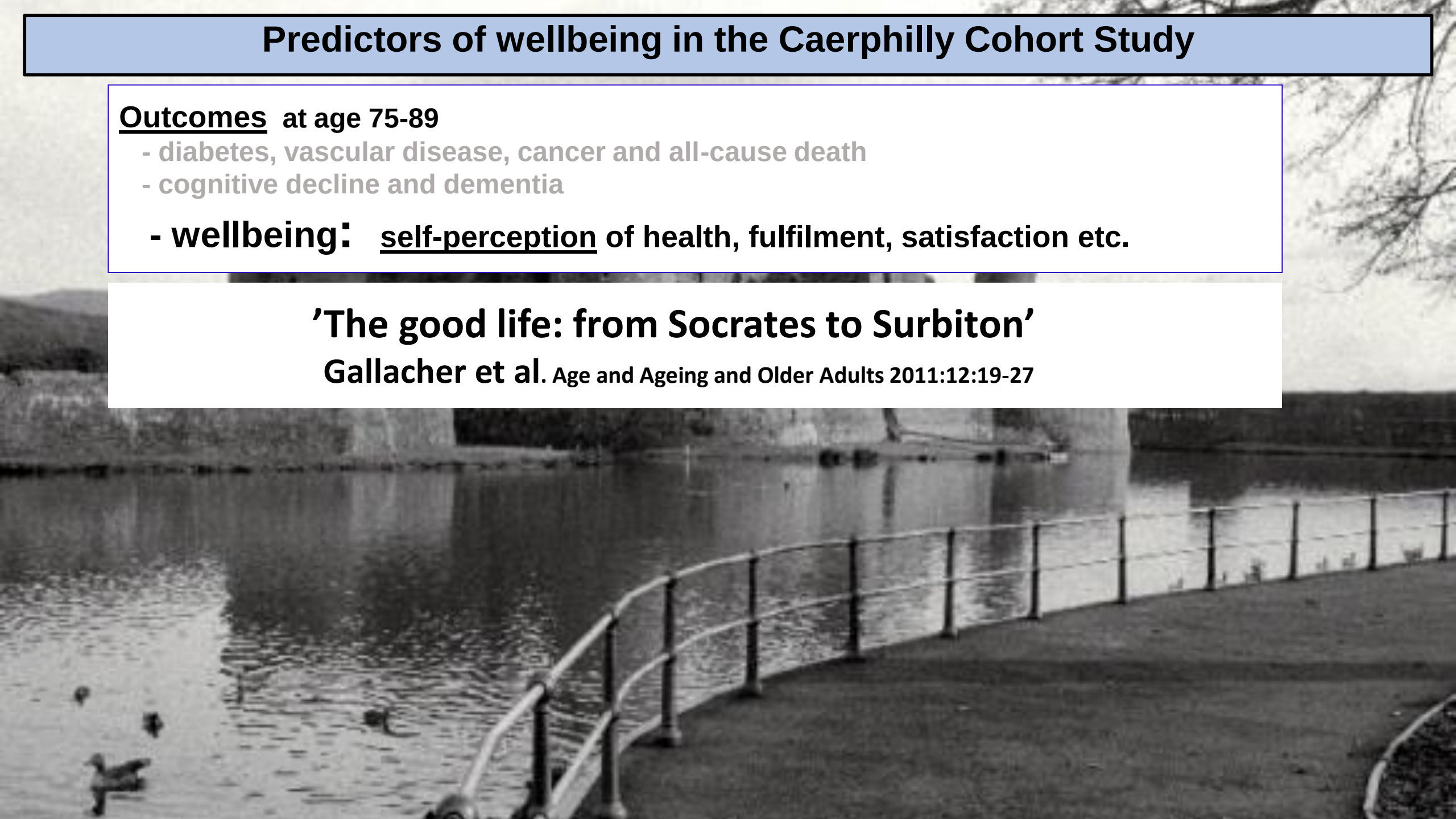
- cognitive decline and dementia
- wellbeing: self-perception of health, fulfilment, satisfaction etc.

’The good life: from Socrates to Surbiton’

Gallacher et al. Age and Ageing and Older Adults 2011:12:19-27



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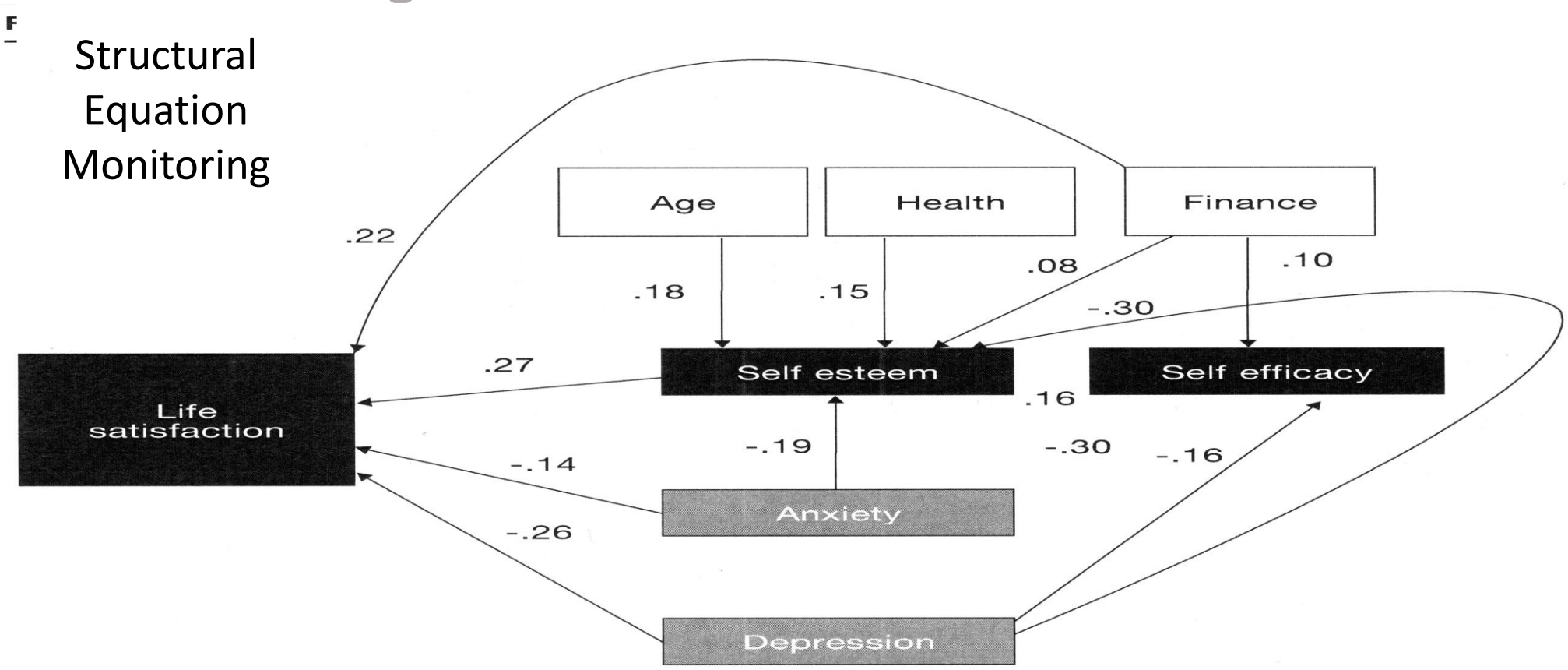
'The good life: from Socrates to Surbiton' Gallacher et al.

Structural Equation Monitoring



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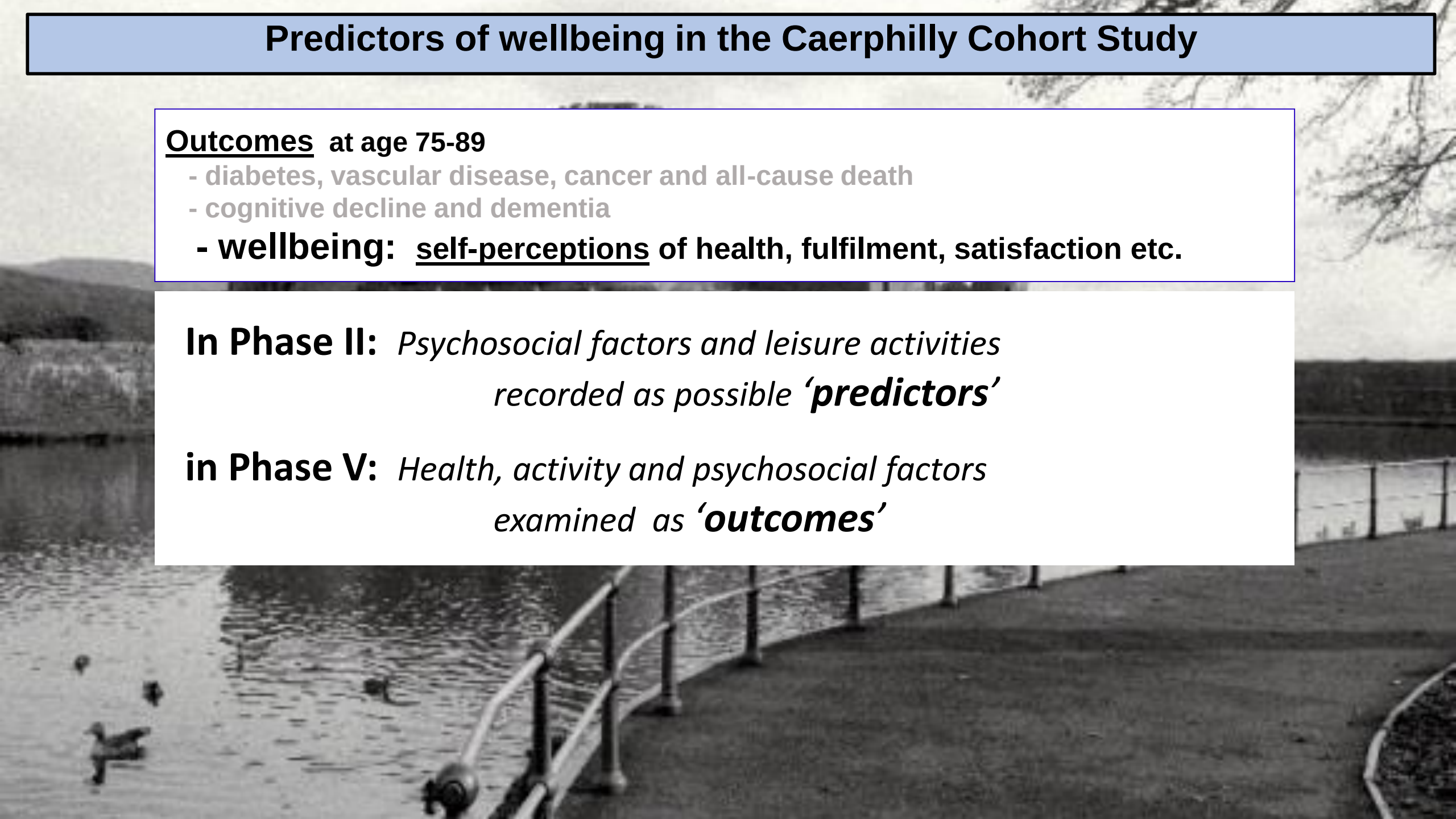
- **wellbeing:** **self-perceptions** **of health, fulfilment, satisfaction etc.**

In Phase II: *Psychosocial factors and leisure activities recorded as possible* ***'predictors'***

in Phase V: *Health, activity and psychosocial factors examined as* ***'outcomes'***



Predictors of wellbeing in the Caerphilly Cohort Study

'WELLBEING'

Health *GHQ, ADL*

social support *Brown et al 2003*

self esteem *Diener et al 1985*

satisfaction with life *Diener et al 1985*

positive attitudes *Kuppens et al 2008*

affect *anxiety, depression*

Predictive factors 20-30 years previously

- Social factors and contacts: marriage, family size, social class etc.
- **Lifestyle …….*more than just having followed five behaviours!***
- Baseline mood: GHQ, depression, anxiety
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- cognitive decline and dementia
- **wellbeing:** self perception of *health, satisfaction, self-esteem, social support….*

Health at age 75-89 years *and* ***prior lifestyle*** *GHQ and ADL*

Subjects own estimate of general health

- **'Unhealthy' lifestyle** *53% judged themselves to be in* ***'good health'***
- **'Healthy' lifestyle** ***89%*** *judged themselves to be in* ***'good health'*** *P<000.5*

fewer had problems with activities of daily living
fewer had anxiety or depression

Predictors of wellbeing in the Caerphilly Cohort Study

Outcomes **at age 75-89**

- diabetes, vascular disease, cancer and all-cause death
- cognitive decline and dementia
- **wellbeing:** *self perception of atisfaction, self-esteem, social support*

Satisfaction with life *at age 75-89 and* **Lifestyle** *20 years earlier*

- **Unhealthy** satisfaction with life score 26
- **Healthy** satisfaction with life score 28

P<0.06

Predictors of wellbeing in the Caerphilly Cohort Study

Outcomes **at age 75-89**

- diabetes, vascular disease, cancer and all-cause death
- cognitive decline and dementia
- **wellbeing:** *self perception of satisfaction, self-esteem, social support*

Self-efficacy at 75-89 years and **Lifestyle** *and 15-20 years earlier*

	Score	
- Unhealthy	self-efficacy score	24.3
- Healthy	self-efficacy score	25.6

P<0.05

Predictors of wellbeing in the Caerphilly Cohort Study

Outcomes **at age 75-89**

- diabetes, vascular disease, cancer and all-cause death
- cognitive decline and dementia
- **wellbeing:** *self perception of satisfaction, self-esteem, social support*

Lifestyle *and* positive attitudes *15-20 years later* *Kuppens et al 2008*

	'interested'	*'enthusiastic'*	*'useful'*	*'capable'*	*important'*
- Unhealthy	***60%***	***38%***	***57%***	***57%***	***72%***
- Healthy	***85%***	***62%***	***85%***	***62%***	***78%***
	P<0.0005	*P<0.0005*	*P<0.0005*	*P<0.0005*	*P<0.23*


Dublin - Liverpool
Dublin - Holyhead
Cemaes Bay
Amlwch
Holyhead
Holy Island
Anglesey
Rhoscolyn
Bodorgan
Carnarvon Bay
Caernarvon
Bangor
Bethesda
Llandudno
Colwyn Bay
Rhyl
Prestatyn
Point of Ayr
Liverpool Bay
Liverpool
Bootle
Wallasey
Birkenhead
Bebington
Speke
Runcorn
Warrington
St Helens
Ellesmere Port
Chester
Northwich
Winsford
Nantwich
Denbigh
Mold
Flint
Holywell
Buckley
Ruthin
Wrexham
Llangollen
Chirk
Corwen
Whitchurch
Ellesmere
ENGLAND
Oswestry
Wem
Shrewsbury
Welshpool
Newtown
Llanidloes
Knighton
Rhayader
Llandrindod Wells
Builth Wells
Hay-on-Wye
Hereford
Leominster
Abergavenny
Monmouth
Chepstow
Pontypool
Cwmbran
Newport
Caerphilly
Cardiff
Caerdydd
Penarth
Barry
Bristol
Portishead
Clevedon
Weston super Mare
Bristol Channel
Bridgend
Porthcawl
Port Talbot
Neath
Swansea
Abertawe
Llanelli
Carmarthen
Ammanford
Merthyr Tydfil
Aberdare
Rhondda
Maesteg
Brecon
Brecon Beacons National Park
Cambrian Mountains
Llandovery
Lampeter
Tregaron
Aberaeron
Aberystwyth
Machynlleth
Barmouth
Dolgellau
Harlech
Snowdonia N.P.
Bala
Blaenau Ffestiniog
Porthmadog
Pwllheli
Criccieth
Caernarfon
Snowdon 1085 m
Beddgelert
Betws-y-coed
Llanrwst
Conwy
Abersoch
Aberdaron
Bardsey Island
Irish Sea
Irish Sea
WALES
UNITED KINGDOM
UNITED KINGDOM
Cardigan
Newcastle Emlyn
Fishguard
Fishguard - Rosslare
St Davids
Haverfordwest
Milford Haven
Pembroke Dock
Pembroke
Tenby
Caldy Island
Castlemartin
Worms Head
Cork - Swansea
Celtic Sea
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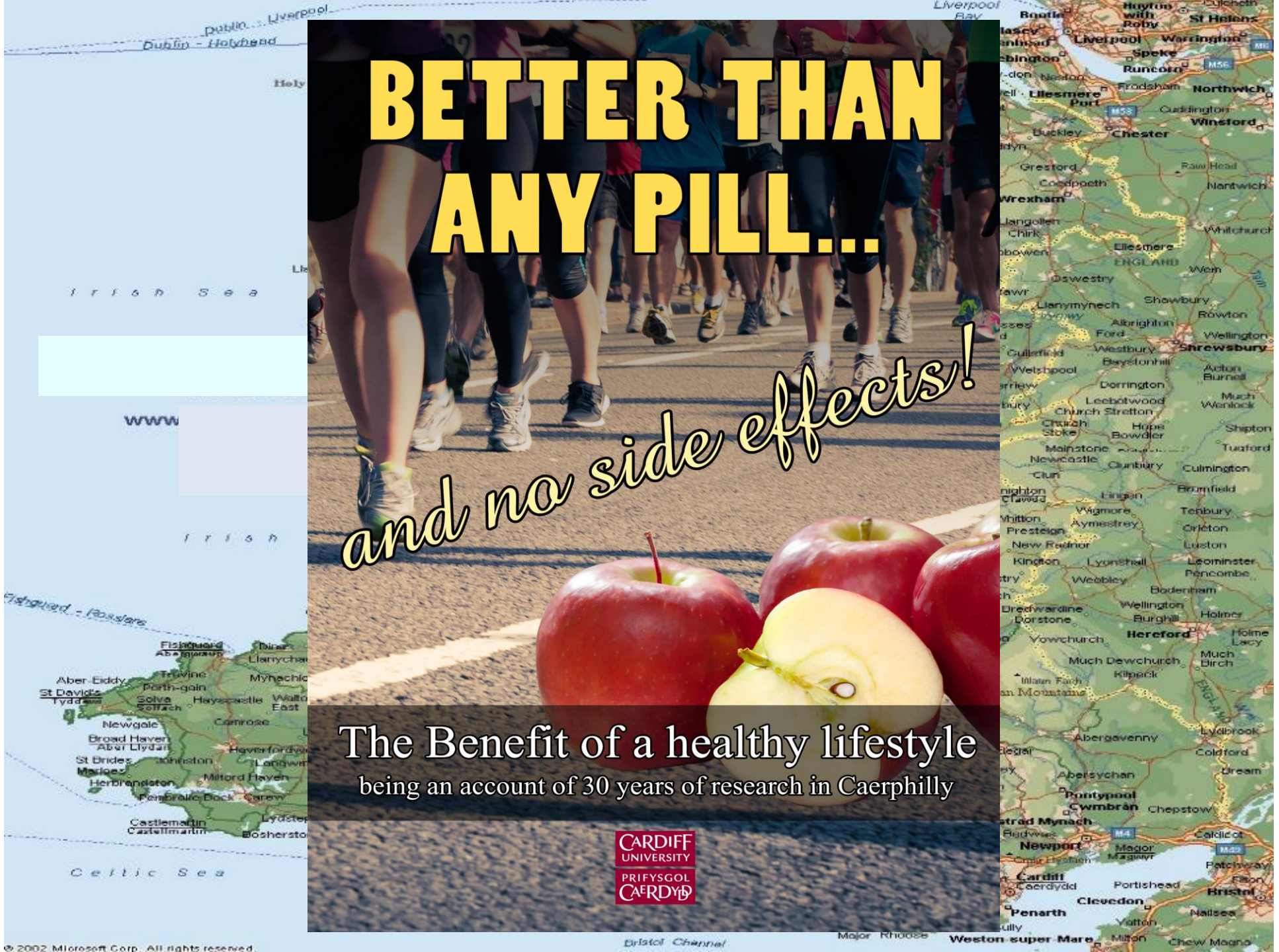

BETTER THAN ANY PILL...
and no side effects!
The Benefit of a healthy lifestyle
being an account of 30 years of research in Caerphilly
CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

The challenge from Caerphilly to the people of Wales:

Take up one additional healthy behaviour…..

….cut smoking… reduce weight…. exercise more….
….check your diet…. reduce alcohol intake…

Then, when well embedded into your lifestyle, take up another healthy behaviour….. and reap the benefits now and into old age!

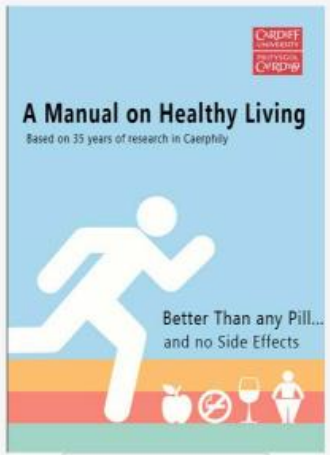
….and the undesirable effects?

….none for you

but an extra decade of care and cost for your children!

HealthyLivingWales.co.uk

Healthy Living Wales



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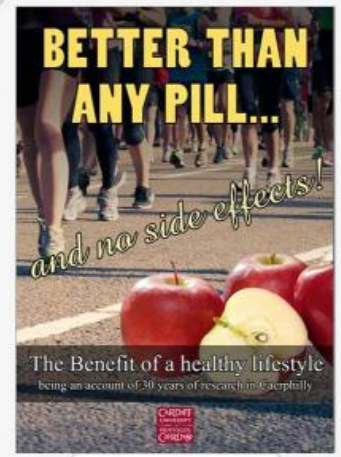
Click on this manual and read how you can protect your own health

A medical research study in Caerphilly has shown a healthy lifestyle gives marked protection against diabetes, heart attacks, strokes, cancer and dementia.

In this website we offer advice and encouragement about how to develop a more healthy way of living and we encourage you to start by first taking up just one additional healthy behaviour… *and then another!*

So do read on…….

On another website we give information about the health benefits to older people of a small daily dose of aspirin:



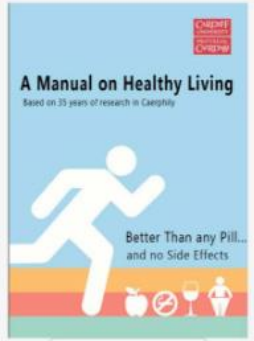
Download PDF »

Click on this booklet and read about the 35-year medical study in Caerphilly

Healthy Living Wales

Dementia

In Caerphilly, the men who followed a healthy lifestyle had huge protection from loss of brain power - almost 70% less dementia!



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And the men who followed a healthy lifestyle but still got dementia were, on average, seven years older that those who had followed none of the behaviours and got dementia.

A good principle is 'Use it or lose it!'

If you really want to preserve your brain power then keep it active. Men who spend their leisure time actively lose much less nouce.... and face it.... sitting watching TV is not active leisure.... No way!

Source:

- 1. Healthy Lifestyles Reduce the Incidence of Chronic Diseases and Dementia: Evidence from the Caerphilly Cohort Study. 2013: PLOS ONE: Dec. 09, 2013 DOI: 10.1371/journal.pone.0081877
- 2. Lifestyle and the risk of dementia in Japanese-american men. J Am Geriatr Soc 60: 118-123.
- 3. Combined impact of smoking and heavy alcohol use on cognitive decline in early old age: Whitehall II prospective cohort study. Br J Psychiatry 203: 120-125.
- 4. Obesity phenotypes in midlife and cognition in early old age: the Whitehall II cohort study. Neurology 79: 755-762.

CONCLUSIONS

1. **A healthy lifestyle is associated with large reductions in disease and disablement**

   - only 5% of people in Wales follow a healthy lifestyle

   - yet a healthy lifestyle is under a subjects control, costs nothing and has no undesirable side effects!

CONCLUSIONS

1. **A healthy lifestyle is associated with large reductions in chronic disease**

   - only 5% of people in Wales follow a healthy lifestyle
   - yet a healthy lifestyle is under a subject's control, costs nothing and carries no undesirable side effects

2. **Many factors are predictive of dementia**

   - a healthy lifestyle is associated with a reduction of 50-60% in cognitive function and in dementia
   - hypertension, vascular disease and diabetes increase the risk, probably by 50 – 100%
   ***diabetes would seem to be of particular interest** , increasing the risk by about 50%*
   - almost 70% of new diabetes is attributable to overweight
   - good control of blood glucose reduces cognitive loss
   - intensive dietary intervention can achieve remission of diabetes (Lancet two weeks ago)
   ***- a high blood rheology** appears to be a risk factor…. and this is testable*
   - other factors – social support, hearing loss, sleep disturbance may be predictive

   but the independent association of these and other possible factors needs to be determined

CONCLUSIONS

1. **A healthy lifestyle is associated with large reductions in chronic disease**

   - only 5% of people in Wales follow a healthy lifestyle
   - but a healthy lifestyle is under a subject's control, it costs nothing and carries no undesirable side effects

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   - other factors – social support, hearing loss, sleep disturbance may be predictive
   but the independent association of these and other possible factors needs to be determined

3. **There is no accepted definition of 'wellbeing'**

   - it is dependent upon the perception of health, of satisfaction, the level of self-efficacy, and a positive attitude
   - again, a healthy lifestyle appears to be associated with increases in some of these aspects

again, the independent association of these and other possible factors needs to be determined

CONCLUSIONS

1. A healthy lifestyle is associated with large reductions in chronic diseas

- *only 5% of people in Wales follow a healthy lifestyle*
- *a healthy lifestyle is under a subjects control, it costs no*

2. Many factors are predictive of dementia

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Healthy living

Better than any pill... and no side effects!

CONCLUSIONS

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   - *this proportion appears to*

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   - *a*
   - *hy*

   - *a high*
   - *other f*

   factors needs to be determined

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   - *it is depen* *, of satisfaction, the level of self-efficacy, and a positive attitude*
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again, the indep* *association of these and other possible factors needs to be determined

HEALTHY LIVING? - WHAT A BLUNT INSTRUMENT!

- What about residual confounding?
- What about reverse causality?
- No biological mechanisms have been identified!
- No protein or enzyme can yet be been targeted!

Let's wait for better understanding.....

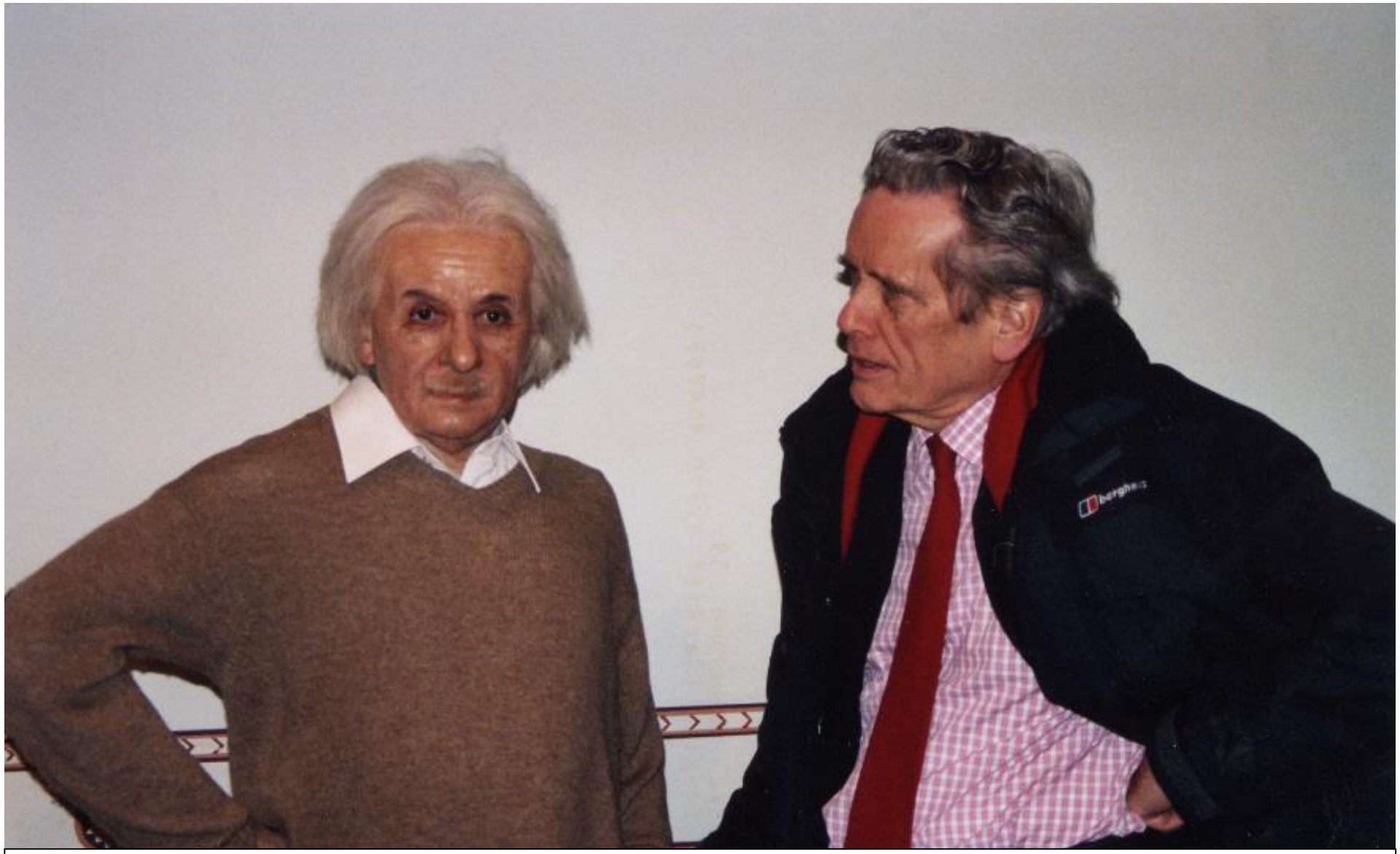
....let's wait for a silver bullet!


Healthy living
Better than any pill… and no side effects!

John Gallacher - Psychologist

Janet Pickering Statistician

Tony Bayer - Geriatrician



'……if only I had known the benefits of a healthy lifestyle.'

E.R.U.