

CIBSE ASHRAE 40th Anniversary Seminar
UCL IEDE, 12 Oct 2016

**Health, wellbeing and
indoor environmental quality in buildings**
New Approaches Needed?

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This is not a new subject!

Poor quality, cold, damp, housing with poor sanitation has been associated with ill health and disease for centuries

In 19th and 20th century, main focus was on communicable diseases



Housing and Health: Time Again for Public Health Action

| James Krieger, MD, MPH, and Donna L. Higgins, PhD

Poor housing conditions are associated with a wide range of health conditions, including respiratory infections, asthma, lead poisoning, injuries, and mental health. Addressing housing issues offers public health practitioners an opportunity to address an important social determinant of health. Public health has long been involved in housing issues. In the 19th century, health officials targeted poor sanitation, crowding, and inadequate ventilation to reduce infectious diseases as well as fire hazards to decrease injuries. Today, public health departments can employ multiple strategies to improve housing, such as developing and enforcing housing guidelines and codes, implementing “Healthy Homes” programs to improve indoor environmental quality, assessing housing conditions, and advocating for healthy, affordable housing. Now is the time for public health to create healthier homes by confronting substandard housing. (*Am J Public Health*. 2002;92:758–768)

intrusion by disease vectors (e.g., insects and rats) and inadequate food storage have long been identified as contributing to the spread of infectious diseases.^{9–11} Crowding is associated with transmission of tuberculosis¹² and respiratory infections.^{13–16} Lack of housing and the overcrowding found in temporary housing for the homeless also contribute to morbidity from respiratory infections and activation of tuberculosis.^{17–20}

Chronic Diseases

In more recent years, epidemiological stud-

Renewed Focus: Recent Industry-Focused Initiatives



Health, Wellbeing & Productivity in Offices

The next chapter for green building

BETTER PLACES FOR PEOPLE | PUT WELLBEING AT THE HEART OF YOUR BUILDING

WORLD GREEN BUILDING COUNCIL

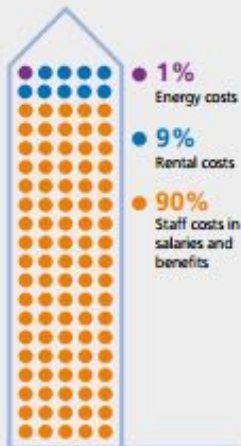
HEALTH, WELLBEING & PRODUCTIVITY IN RETAIL: THE IMPACT OF GREEN BUILDINGS ON PEOPLE AND PROFIT

UK GREEN BUILDING COUNCIL

UK PROJECT SPONSORED BY:
AkzoNobel, Rodbo, HOARE LEA

HEALTH AND WELLBEING IN HOMES

Typical business operating costs¹



10% Variation

A 10% variation applied equally to each cost has a far from equal impact

+/- 0.1%

Energy costs

+/- 0.9%

Rental costs

+/- 9.0%

Staff costs

BETTER PLACES FOR PEOPLE | PUT WELLBEING AT THE HEART OF YOUR BUILDING



Steps towards healthy buildings

THE **WELL** BUILDING STANDARD[®]

VERSION 2.0

A Renewed Focus: Why Now?

- Long tradition of public health and policy focus on housing to tackle disease and inequality.
- Health and Wellbeing always complementary to environmental/green design - natural progression
- Topic getting deeper, requires separate dedicated focus?
- Buildings as an opportunity to add value – no ‘simple’ avoiding of risks, but ‘adding value’, to individuals, business and communities.
- ‘Wellness’ and ‘Productivity’ Industry: New Market opportunities beyond government-led programmes
- Sense that energy efficiency agenda is difficult to sell and implement by itself?

WHAT IS HEALTH, WELLBEING AND COMFORT ANYWAY?

Highlight: What is Health?

Health is a state of complete physical, mental and social **well-being** and not merely the absence of disease or infirmity.

ref: Preamble to the Constitution of the **World Health Organization** as adopted by the International Health Conference, New York, 19 June - 22 July 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948. The definition has not been amended since 1948.

<http://www.who.int/suggestions/faq/en/>

Highlight: What is Wellbeing?

Well-being: “*The state of being comfortable, healthy, or happy*”
(Oxford Dictionary, <https://en.oxforddictionaries.com/definition/well-being>)

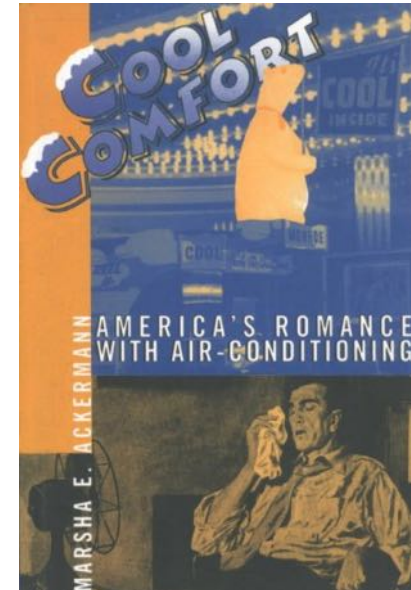
- Happiness (hedonic approach) – positive affects?
- Life satisfaction and quality of life?
- Flourishing approaches: “*Well-being is more than just happiness. As well as feeling satisfied and happy, well-being means developing as a person, being fulfilled, and making a contribution to the community*” (Shah and Marks, 2004, in: Dodge et al., 2012)
- Links to positive psychology, wider psychology, sociology, economics etc.

What is (Environmental) Comfort?

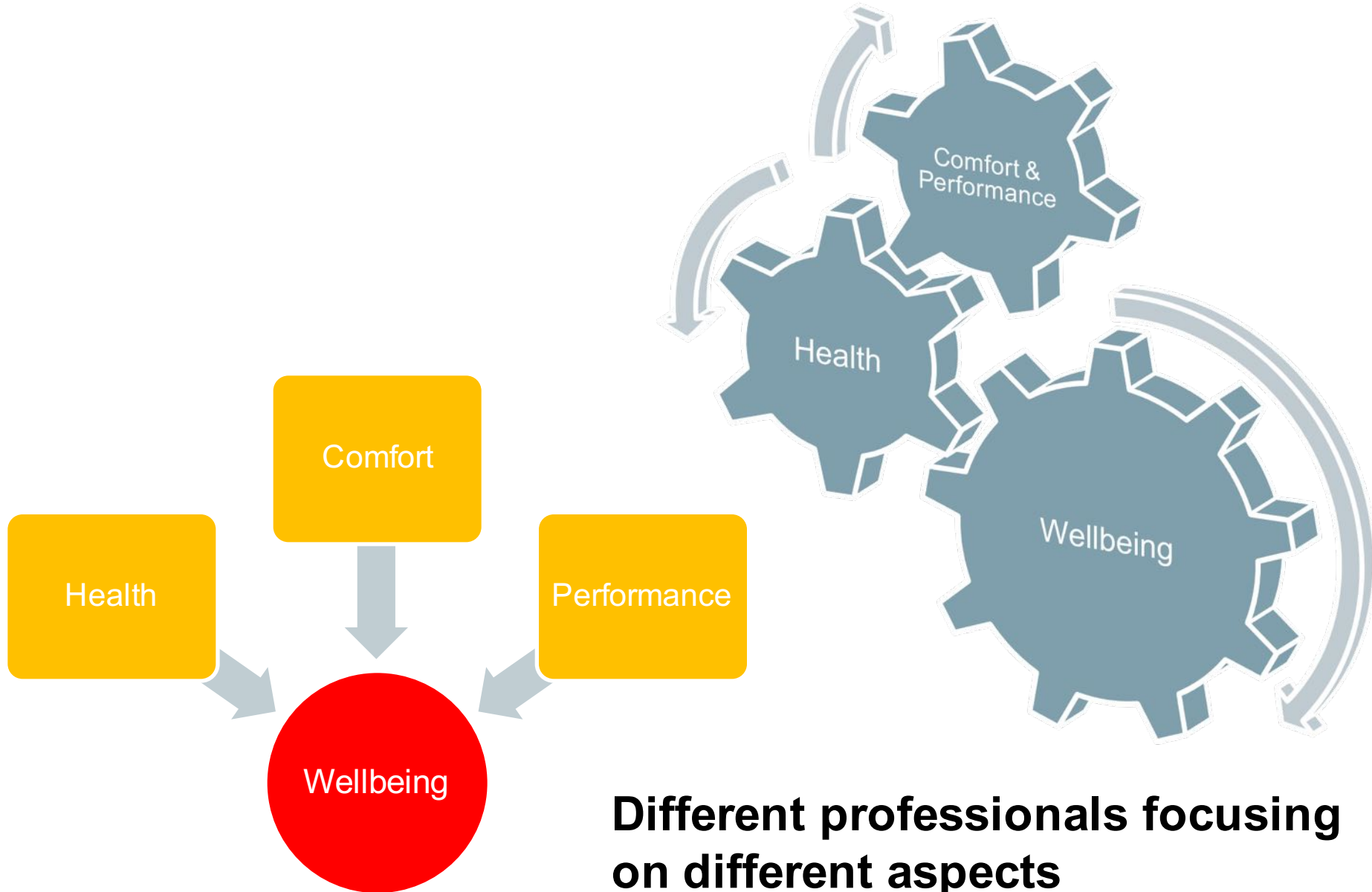
A **perception of the environment**, a combination of physical and psychological stimuli, on occasions also mediated by social conventions.

Being/feeling comfortable entails:

- A 'neutral' state?
- “A state of physical ease and freedom from pain or constraint”? (Oxford dictionary)
- Satisfaction/delight with environment?
- How do technological advances affect comfort?
- Does Comfort = Wellbeing?



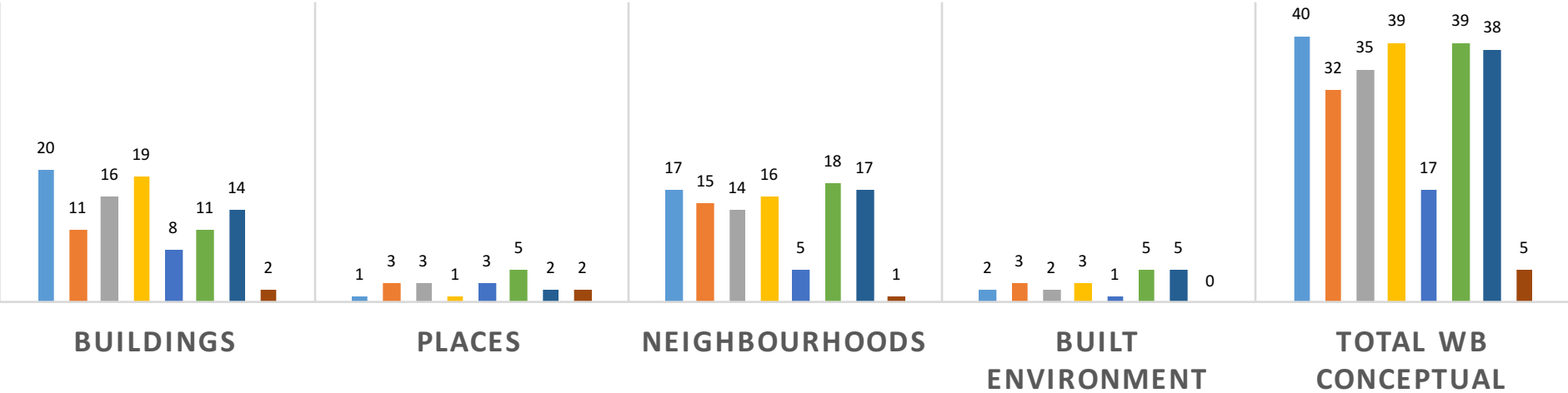
A continuum, or one includes the other?



Different professionals focusing on different aspects

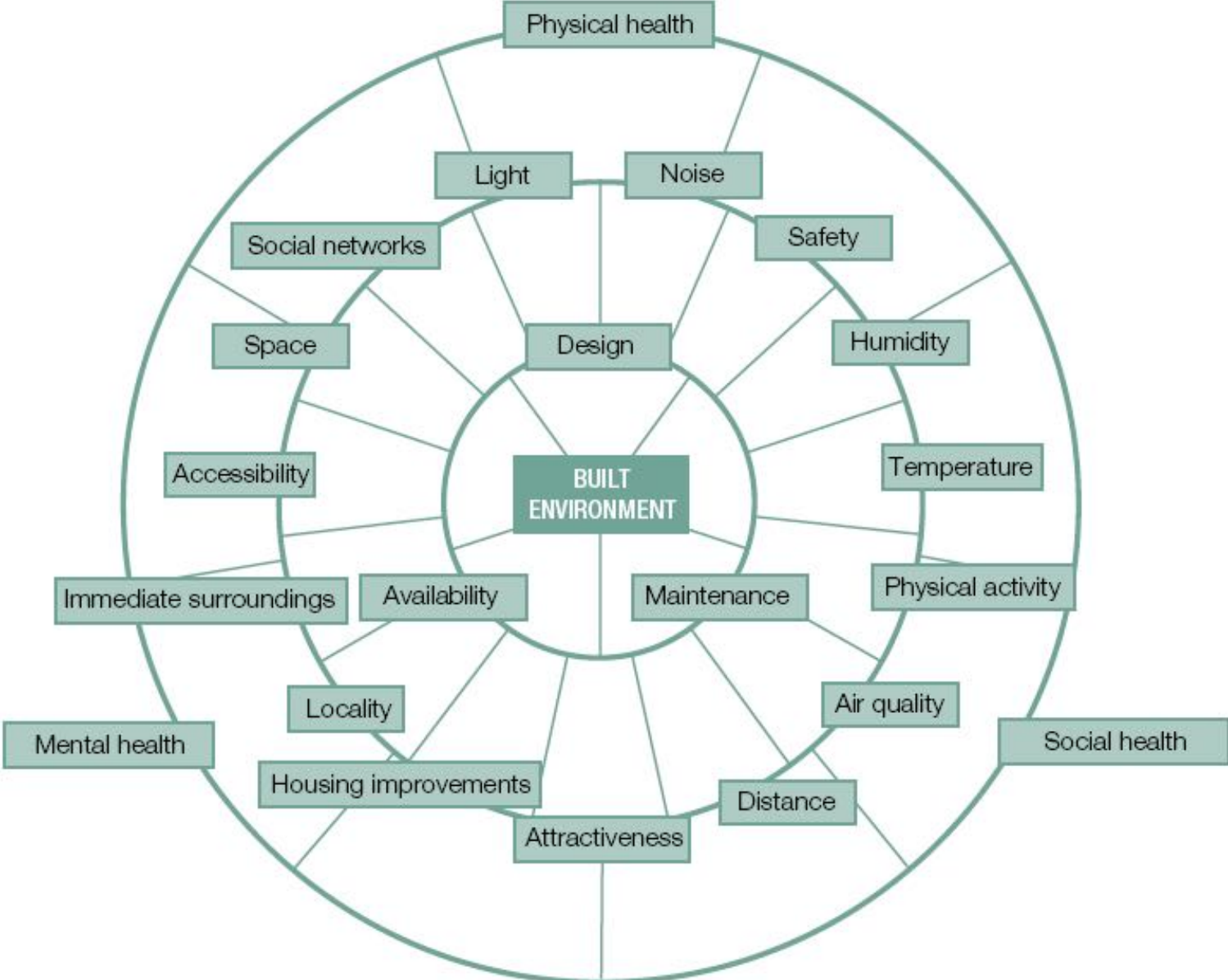
WELLBEING CONCEPTUALISATIONS VS. SCALE

- Environmental satisfaction and/or Comfort
- Physical/ Physiological health
- Eudaimonic (Psychological)
- Other
- Mental health / Ill-being
- Hedonic (Subjective wellbeing)
- Social
- Unspecified



**THE CHALLENGE OF
DIFFERENT PROFESSIONALS OUTLOOKS
RISK FACTORS AND RANKING EXAMPLE**

Built Environment and Health

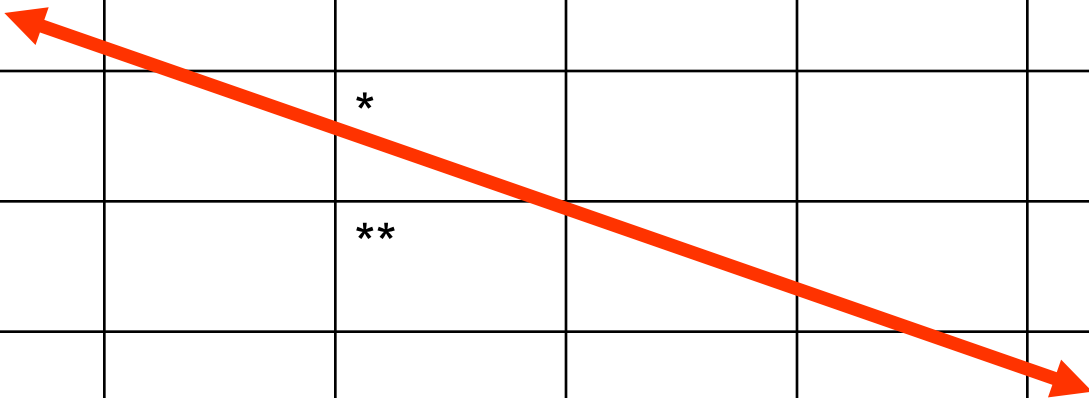


Lavin et al., (2006), *Health Impacts of the Built Environment: a Review*, The Institute of Public Health in Ireland.

Ranking Risk

What risks would you rank highest/lowest?

Class of harm	Number of people affected in the UK per year					
	100 000+	10 000+	1000 +	100+	10+	1+
Class I	High Risk		***			
Class II			*			
Class III			**			
Class IV						Low Risk



Stars are used to indicate strength of evidence

CLG, (2008), *BD 2518 Review of Health and Safety Risk Drivers, Communities and Local Government*, www.communities.gov.uk

Domestic Health and Safety Hazard	Category	Risk Index
Hygrothermal conditions	A	83
Slips, trips and falls on the level		78
Particles and fibres		78
Radon		78
Environmental tobacco smoke		72
Slips, trips and falls on stairs, ramps and escalators		71
Security and the effects of crime		B
Noise	70	
House dust mites	69	
Burns and scalds	68	
Fires in buildings	67	
Carbon monoxide	66	
Fungal growth	62	
Lighting	62	
Space and crowding	62	
Lead	61	
Slips, trips and falls from windows, balconies and roofs	C	
Oxides of nitrogen		60
Toilet facilities		60
Volatile organic compounds		59
Collision/entrapment involving doors		59
Sources of infection other than toilets		58
Electrical hazards		56
Drowning		56
Collision/entrapment involving windows	D	50
Sulphur dioxide		50
Cockroaches		48
Structural collapse and falling objects		48
Explosions in buildings		48
Land contamination including landfill gas		41
Biocides		26
Collision/entrapment involving lifts and escalators		14
Electromagnetic fields	NBRA	

Note: This is the Risk Index with a focus on UK dwellings. The rating may be different in other countries.

CLG, (2008), *BD 2518 Review of Health and Safety Risk Drivers*, Communities and Local Government, www.communities.gov.uk

Mind the Gap: different outlooks

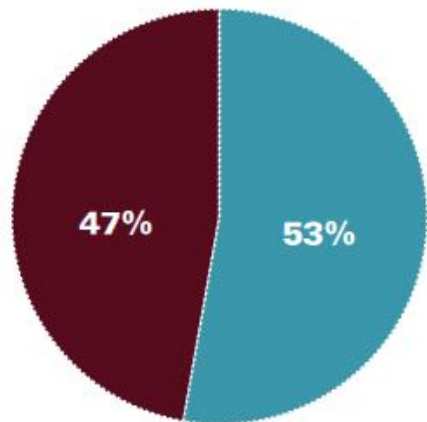
The drive towards healthier buildings, 2014 (US)

Source: McGraw Hill Construction, 2014

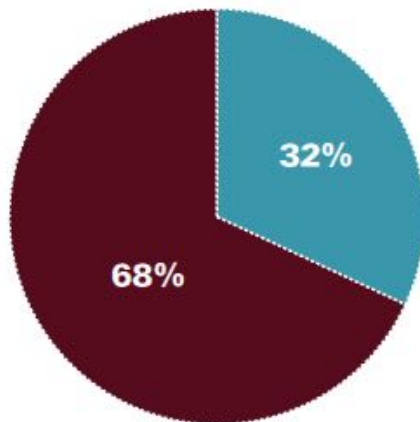
■ Not Seeing Connection Between Buildings and Health

■ YES, Believe That Buildings Impact Patient Health

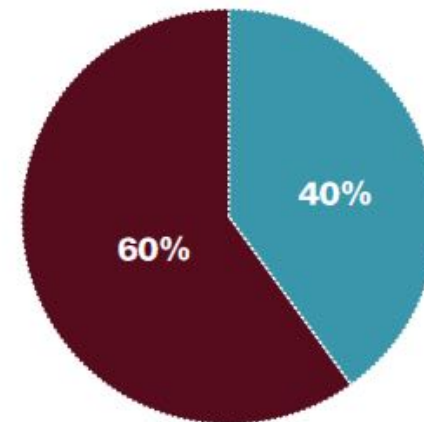
PEDIATRICIANS



GENERAL PRACTITIONERS



PSYCHOLOGISTS/PSYCHIATRISTS



Report, NHS Alliance and Sitra,
DCLG Funded
*Supporting the housing sector in taking
forward its work with Clinical
Commissioning Groups*

Three

THE NEED FOR INTEGRATED AND ROBUST/RESILIENT DESIGN



<http://www.healthtriangle.org/2011/09/understanding-how-health-triangle-works.html#more>

ASHRAE 55 2013 (for air speed 0.2 m/s; metabolic rates 1.0-1.3 met)

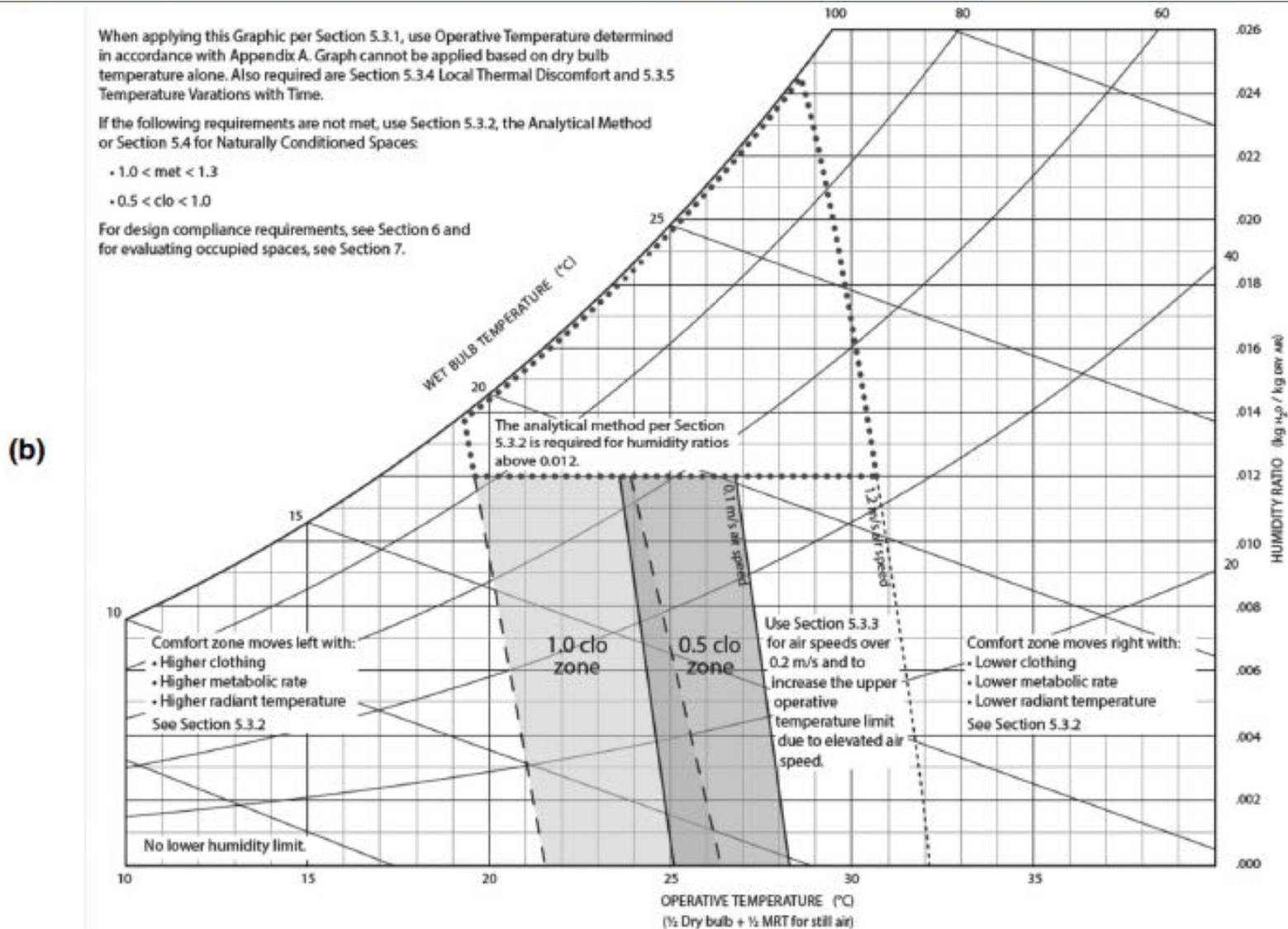
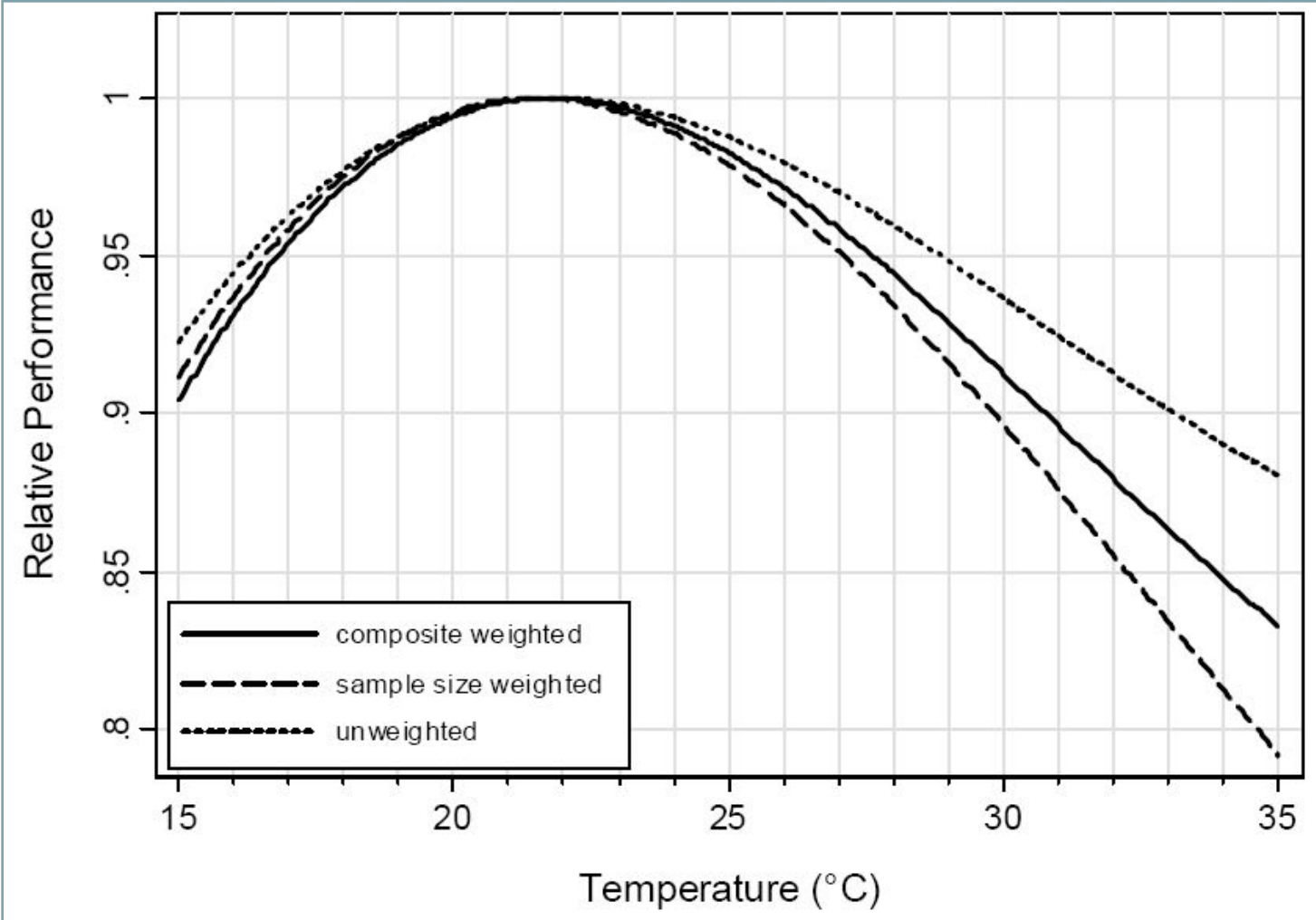


FIGURE 5.3.1 Graphic Comfort Zone Method: Acceptable range of operative temperature (t_o) and humidity for spaces that meet the criteria specified in Section 5.3.1 ($1.0 \leq met < 1.3$; $0.5 < clo < 1.0$)—(a) I-P and (b) SI.

The Quest for Ideal/Optimal Environmental Conditions

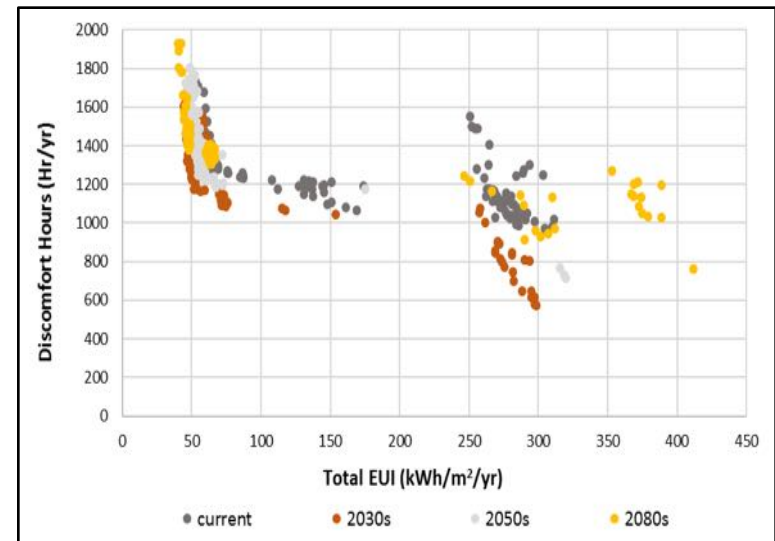


Seppänen et al., 2006, EFFECT OF TEMPERATURE ON TASK PERFORMANCE IN OFFICE ENVIRONMENT, <http://eetd.lbl.gov/ied/pdf/LBNL-60946.pdf>

Integrated Design: Leveraging Computational Power Optimising Design (for Robust Performance!)

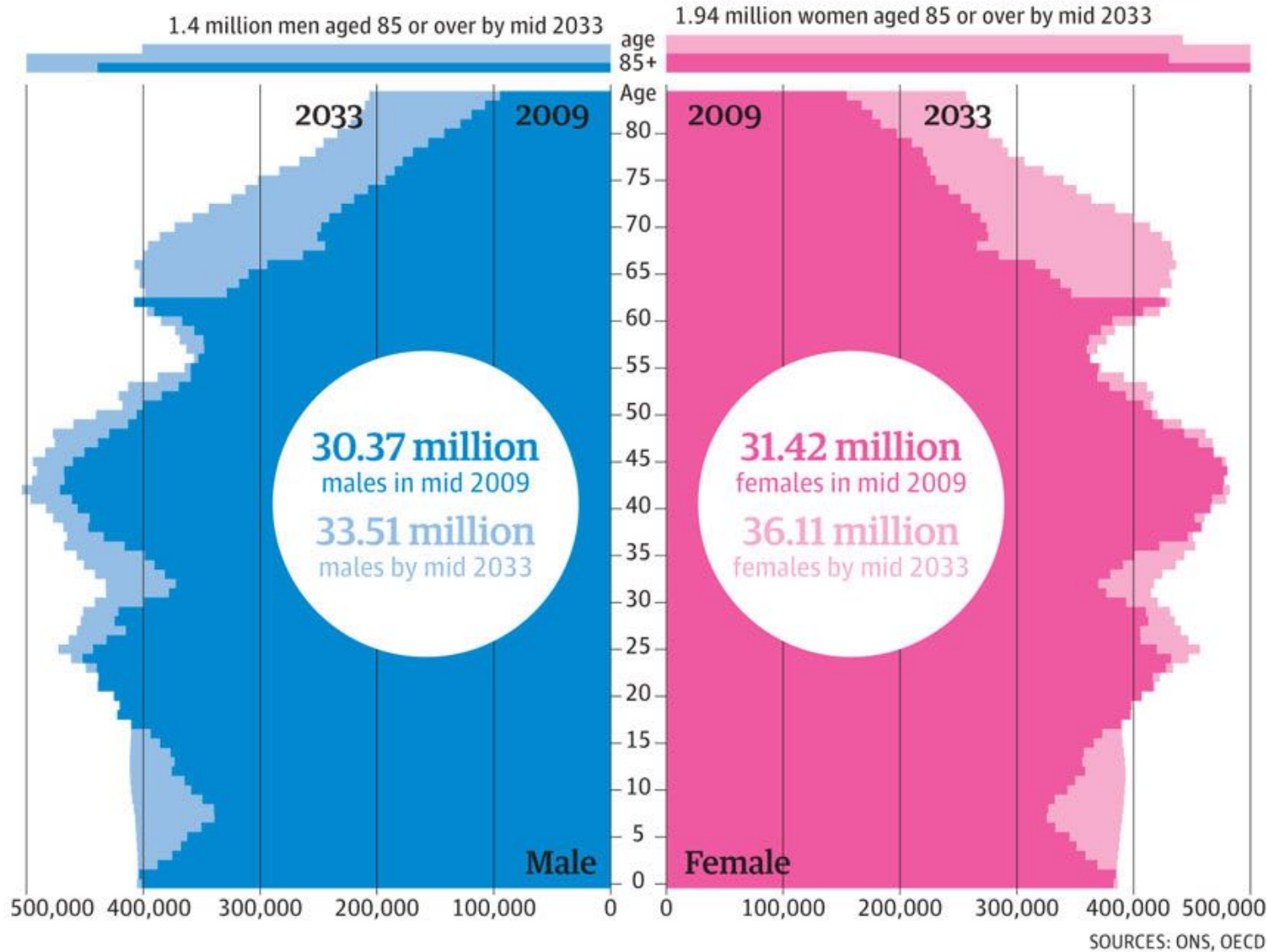
What is the Optimal Design?

- ~~What is the Optimal Design?~~
- Under what conditions is this design 'optimal'?
 - ❖ Future (e.g. climate)
 - ❖ Different users (incl age of occupants)
 - ❖ Operational strategies
 - ❖ Changes to Layout



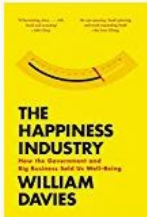
Age structure of the UK population

■ Males 2009 ■ Males 2033 ■ Females 2009 ■ Females 2033

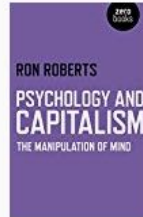


Reflections: Ethics, Politics and More

Customers who viewed **The Wellness Syndrome** also viewed




The Happiness Industry: How the Government and Big Business Sold Us Well-Being
★★★★☆ 8
£8.06  Prime
50 used and new from £5.00



Psychology and Capitalism: The Manipulation of Mind
★★★★☆ 4
£9.99  Prime
37 used and new from £3.98



Smile or Die: How Positive Thinking Fooled America and the World
★★★★☆ 74
£8.99  Prime
51 used and new from £2.83

- The Wellness/Happiness ‘Syndrome’: is it all positive?
- Our role as professionals: ethics and equality

Free Range or Battery Farmed?



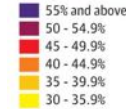
"These graphs represent productivity between free-range and cubicled workers."

https://s3.amazonaws.com/lowres.cartoonstock.com/business-commerce-presentation-productivity-free_range-cubicles-office_cubicle-mbcn1353_low.jpg

Health Inequalities

England's health inequality mapped

Local authorities by % of children not achieving a good level of development

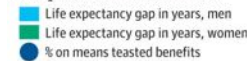


Greater London

Westminster 53.4%



Life expectancy gap shows the difference between the richest and poorest in each council



Redcar & Cleveland 49.0%



Tower Hamlets 54.4%



Wirral 42.1%



Solihull 30.7%



Cornwall 44.2%



SOURCE: LONDON HEALTH OBSERVATORY

<https://www.theguardian.com/news/datablog/2011/feb/11/marmot-report-health-equality-data>

Health, Wellbeing and Sustainable Buildings

A New Master's Degree



Are You Interested in Making our Buildings and Cities Better Places to Live?

***A new initiative from UCL IEDE, at the Bartlett.
MSc Health, Wellbeing and Sustainable Buildings***

This exciting new MSc programme will create a new generation of experts who can innovatively tackle health and wellbeing in the design, assessment, retrofit and operation of residential and non-domestic sustainable buildings.

This course builds on UCL IEDE's strong links with industry and influential health and wellbeing research



“Clients increasingly want design teams that truly understand how the built environment impacts health, happiness and productivity. It’s an interdisciplinary challenge requiring new skills and collaboration between industry and academia.”

Edward Garrod, Principal, UK Head of Sustainability + Integrated Design, Elementa Consulting

“This MSc course is aspiring to equip new engineers with the right skills to face the challenges of the future.”

Dr Anastasia Mylona, Research Manager, Chartered Institution of Building Services (CIBSE)

"I have no hesitation in recommending this course of study for architects wishing to develop their knowledge and skills for health and wellbeing of users."

Lynne Sullivan OBE, Architect, RIBA - LSA Studio, RIBA Ambassador on Climate Change, Chair of RIBA Sustainable Futures, Chair Good Homes Alliance

Term One

Health,
Comfort &
Wellbeing in
the Built
Environment

Methods of
Environmental
Analysis

Wellbeing in
Buildings:
Theory &
Practice

Integrated
Building
Design for
Health,
Comfort &
Wellbeing

Term Two

(Optional Modules: choose 2 out of 3)

Indoor Air
Quality in
Buildings

Health &
Wellbeing
in Cities:
Theory &
Practice

Light,
Lighting &
Wellbeing
in
Buildings

Building
Acoustics

Designing
Inclusive
Places

Term Three

Research project (Dissertation)

Health, Wellbeing and Sustainable Buildings

Virtual Open Day: 25 Nov 2016, 12.00-13.00



Website: www.bartlett.ucl.ac.uk/iede

Course Director: m.ucci@ucl.ac.uk

Admin. Enquires: l.tufekci@ucl.ac.uk

LinkedIn: Find our UCL IEDE group

Twitter: https://twitter.com/ucl_iede



We are part of The Bartlett: UCL's Global Faculty of the Built Environment

IEDE



CIBSE

Conference: Health, Wellbeing and Productivity in Non-Domestic Buildings

12:30pm - 5:40pm (followed by networking drinks)

Wednesday 8th November 2016

Gustave Tuck Lecture Theatre, UCL, Gower Street, London WC1E 6BT





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