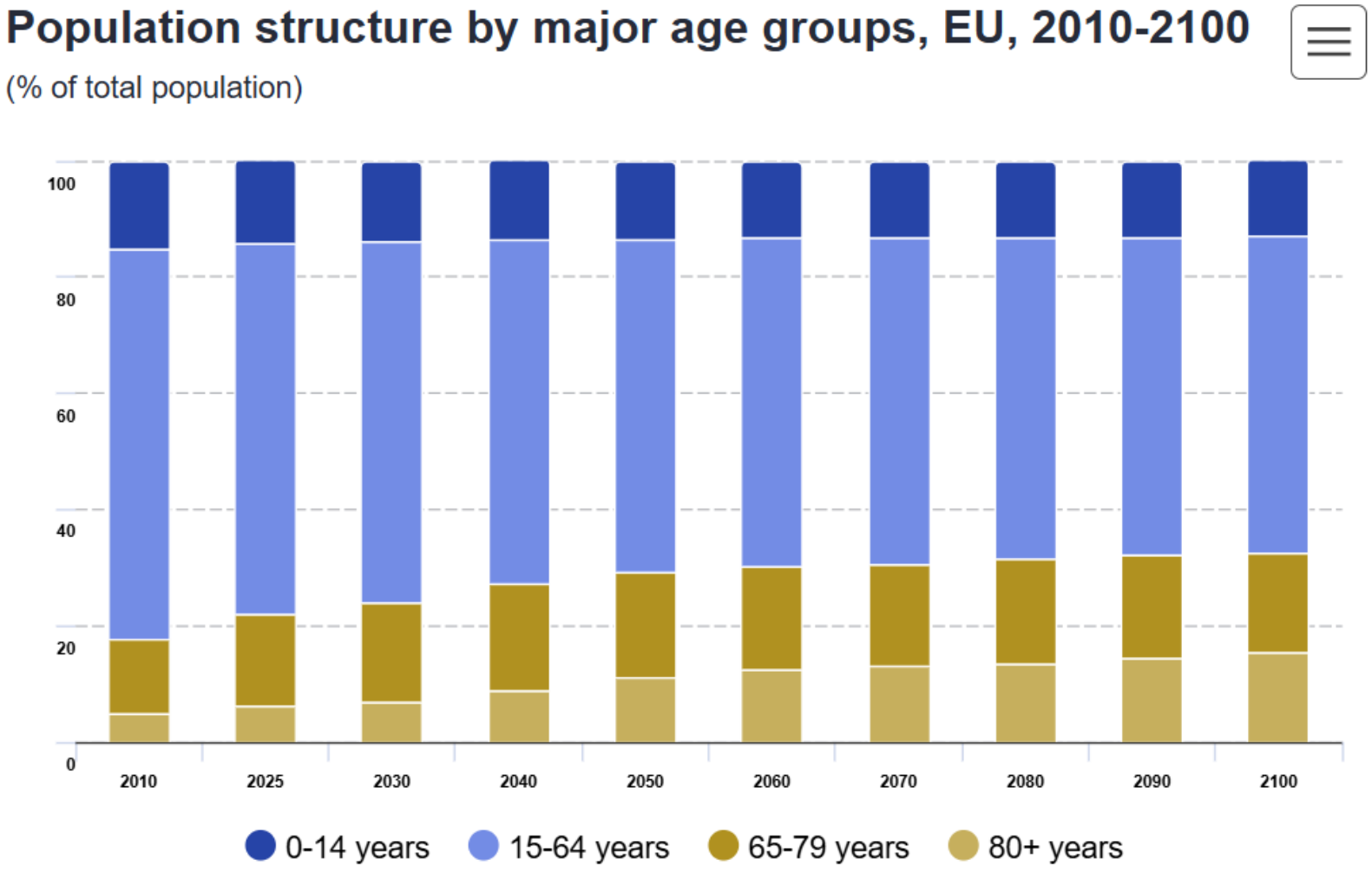
Looking younger & wellbeing

David Gunn (& Mike Hoptroff and Xuelan Gu)

Unilever

It's an ageing world



2030-2100: projections (EUROPOP2023). Source: Eurostat:

Looking younger & wellbeing

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Health-span strongly linked to healthy behaviours

OPEN ACCESS Freely available online

PLOS MEDICINE

Combined Impact of Health Behaviours and Mortality in Men and Women: The EPIC-Norfolk Prospective Population Study

Kay-Tee Khaw[1*], Nicholas Wareham[2], Sheila Bingham[3], Ailsa Welch[1], Robert Luben[1], Nicholas Day[1]

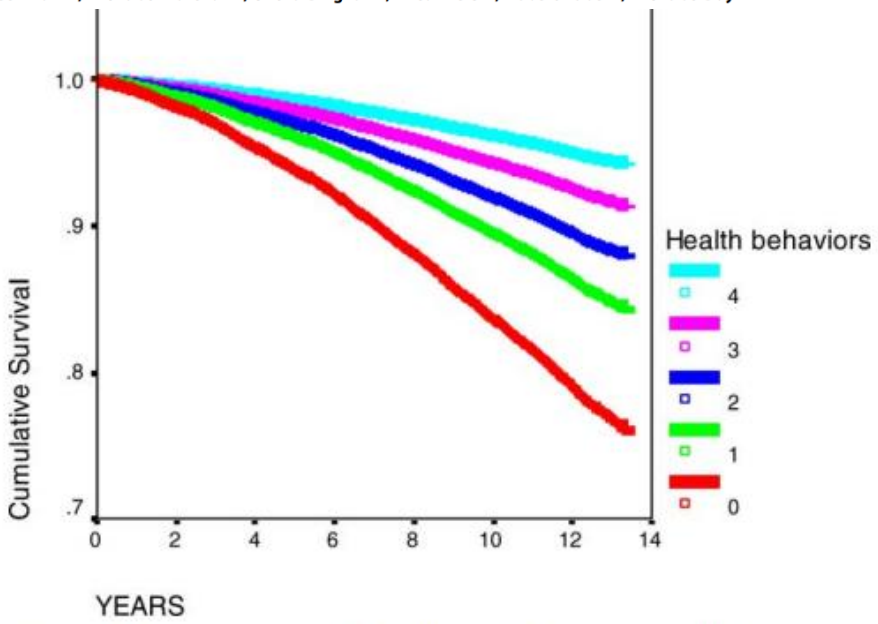

Figure 1. Survival Function According to Number of Health Behaviours in Men and Women Aged 45–79 Years without Known Cardiovascular Disease or Cancer, Adjusted for Age, Sex, Body Mass Index and Social Class, EPIC-Norfolk 1993–2006

doi:10.1371/journal.pmed.0050012.g001

eClinicalMedicine

Volume 92, February 2026, 103741

Minimum combined sleep, physical activity, and nutrition variations associated with lifeSPAN and healthSPAN improvements: a population cohort study

Nicholas A. Koemel [a b c], Raaj K. Biswas [a b c], Matthew N. Ahmadi [a b c],

UK Biobank study of ~59,000 (median age: 64.0 years; 45.4% male)

Increase of:

- 24 min/day of sleep
- 3.7 min/day of moderate-to-vigorous physical activity, and
- a 23-point (of 100) diet quality increase

= 4 additional years of health-span

What has health-span got to do with looking younger?

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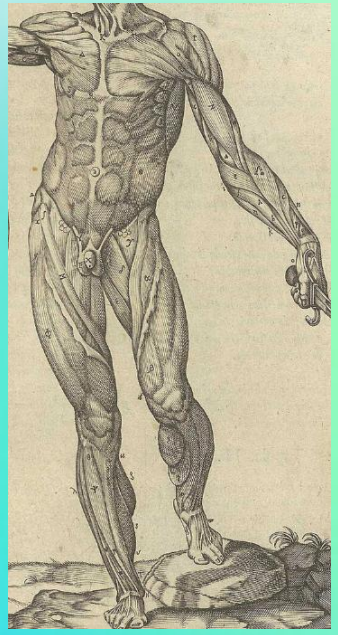
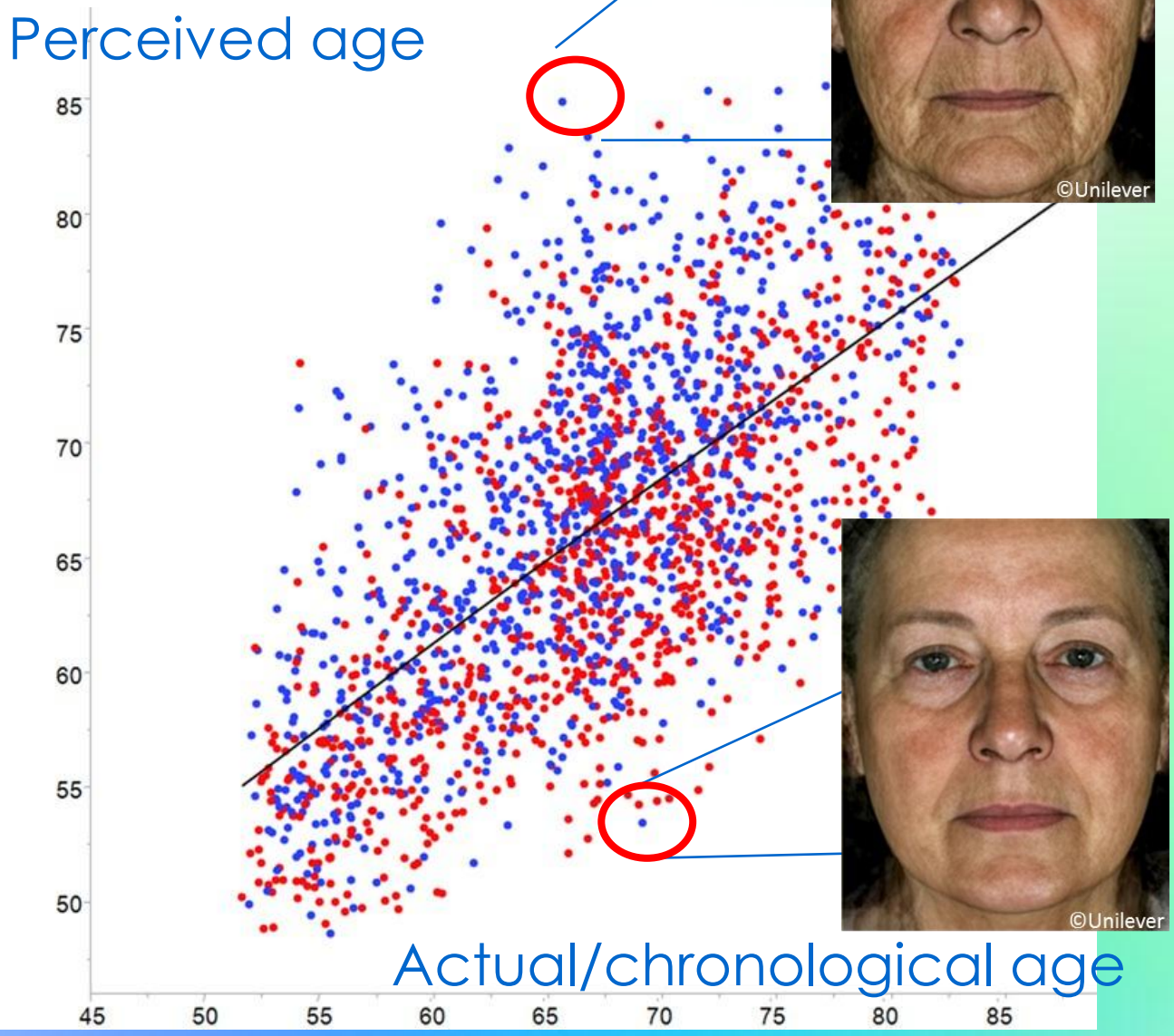
Skin Body
Mind axes



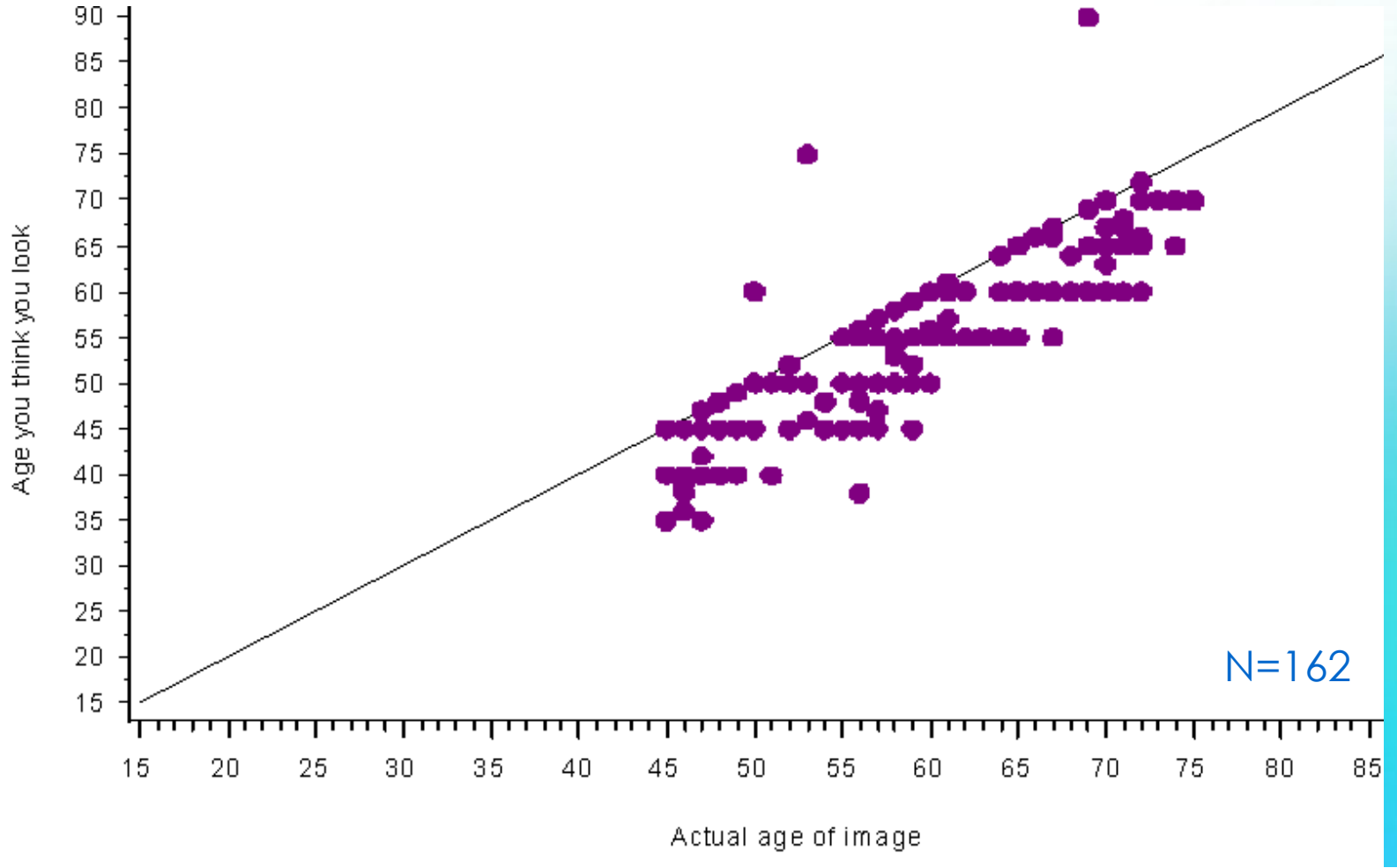
Juan Valverde de Amusco's *Historia de la composicion del cuerpo humano* (Rome, 1560) & Gaspar Becerra illustration

Does youthful looks link to better health and longevity?

Perceived age of 2,693 subjects
288 assessors – 75,096 age assessments >1 year.



Self-assessed perceived age – not a good measure of youthful looks?



What conditions and diseases does youthful looks associate with?

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Those who look young for their age had:

- Less Chronic Obstructive Pulmonary Disease (COPD)
- Less osteoporosis
- Fewer cataracts
- Less Age-Related Hearing Loss (ARHL)
- Better cognition (g-factor)

Supporting evidence

- Bone mineral density in 460 women aged 25-93 years.

Supporting evidence - cognition

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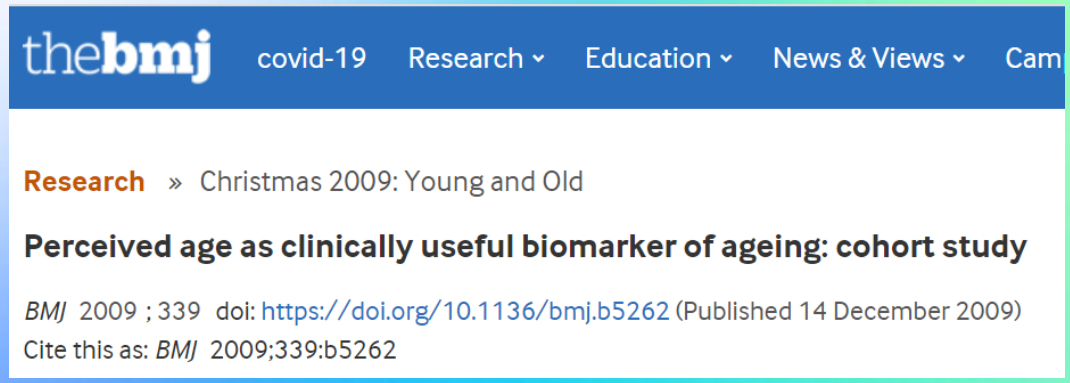
1) In Nutrition and Health of Aging Population in China Project (NHAPC), n=612:

- Those who looked old for their age had higher cognitive impairment (Mini-Mental State Examination).

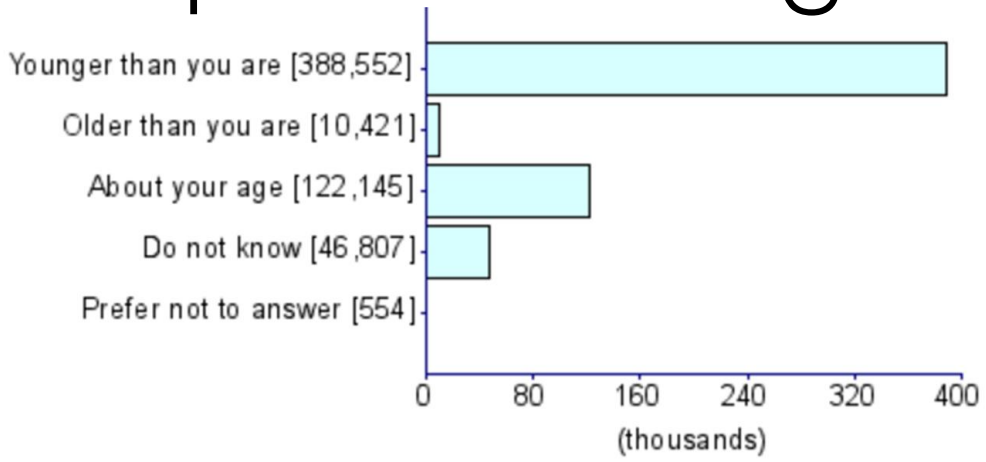
2) Danish cohort (n=1826): Those who looked younger for their age had better cognition (MMSE & cognitive tests)



Self-perceived age predictive of dementia

Unilever

Self-perceived age!



UK Biobank Data – health information on 500,000 participants between 2006 and 2010

- 79 significant genetic associations.
- 19/79 linked to skin ageing or pigmentation
- 14/79 linked to balding.

Follow up of 12.3 years (median).

Those rated themselves looking older had:

- Higher cognitive impairment risk (Digit Symbol Substitution Test, n=42,639)
- Higher risk of dementia (n=~200,000)

What about longevity (mortality)?

Perceived age – passport-type images.

Cohort of n=1826: follow-up 7 years.

- Risk of death increases by 11% every year you are older.
- Risk of death increases by 14% for every year **you look** older.
- It is better to be a year older than look a year older

thebmj covid-19 Research Education News & Views Cam

Research » Christmas 2009: Young and Old

Perceived age as clinically useful biomarker of ageing: cohort study

BMJ 2009 ; 339 doi: https://doi.org/10.1136/bmj.b5262 (Published 14 December 2009)
Cite this as: *BMJ* 2009;339:b5262

How far into the future does it last?

- Face or surrounding driving links to health?
- Predicts death 7-12 years after photos.
- Where face gave a younger age, that twin lived longer.

Journals of Gerontology: Medical Sciences
cite as: *J Gerontolog A Biol Sci Med Sci*, 2015, 1–6
doi:10.1093/gerona/glv090
Advance Access publication August 11, 2015

THE GERONTOLOGICAL SOCIETY OF AMERICA®

Research Article

Mortality is Written on the Face

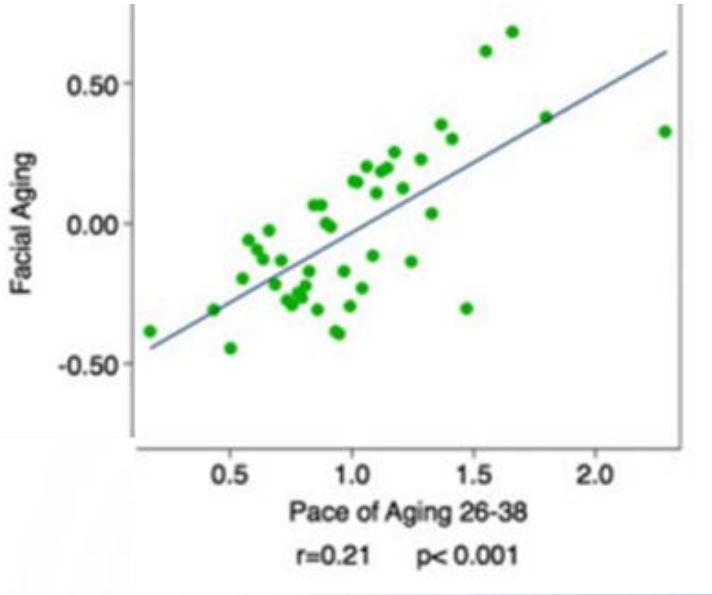
David Andrew Gunn,[1] Lisbeth Aagaard Larsen,[2] Jaspal Singh Lall,[1] Helle Rexbye,[2] and Kaare Christensen[2]

In younger healthy adults?

Perceived facial age V blood biomarkers estimated age.

1) Biological age (10-biomarker US National Health and Nutrition Survey (NHANES)).

2) Pace of Aging calculated.



Strong association between perceived age and:

- biological age at 38 years.
- the pace of ageing over 12 years from 26 years to 38 years.

Challenges to further understanding

- Which features link to which health condition?
- Longitudinal data of many diverse participants.
- Perceived age intensive to measure - 288 age-assessors & 75,096 age assessments in Rotterdam Study

A.I. perceived age predictions also associate with health

		(a) Human		b) Deep learning	
Model		Model 2		Model 2	
Outcome	n	Odds Ratio	P-value	Odds Ratio	P-value
Osteoporosis	2197	0.77 (0.62 - 0.96)	0.02	0.86 (0.67 - 1.11)	0.24
COPD	2282	0.76 (0.68 - 0.85)	0.00	0.75 (0.66 - 0.85)	0.00
Cataracts	2185	0.88 (0.77 - 1.02)	0.09	0.82 (0.7 - 0.97)	0.02
CVD	2271	0.93 (0.79 - 1.09)	0.35	0.99 (0.82 - 1.19)	0.90
AMD	2282	0.94 (0.86 - 1.03)	0.17	0.99 (0.9 - 1.1)	0.91
Outcome	n	B	P-value	B	P-value
ARHL	1945	-0.87 (-1.49 - -0.24)	0.01	-0.99 (-1.69 - -0.28)	0.01
Cognition	1864	0.06 (0.03 - 0.1)	0.00	0.07 (0.03 - 0.11)	0.00

Osteoporosis and Predicted Age on higher resolution images

Model 2	
Odds Ratio	P-val
0.76189 (0.58195 - 0.99746)	0.04788

EADV JEADV JOURNAL OF THE EUROPEAN ACADEMY OF DERMATOLOGY & VENEREOLOGY

ORIGINAL ARTICLE | Open Access

Deep learning predicted perceived age is a reliable approach for analysis of facial ageing: A proof of principle study

Conor Turner, Luba M. Pardo, David A. Gunn, Ruediger Zillmer, Selma Mekić, Fan Liu, M. Arfan Ikram, Caroline C. W. Klaver, Pauline H. Croll, André Goedegebure, Katerina Trajanoska ... See all authors

Explainable A.I. will help determine key features linked to health

Sag

Age spots

Wrinkles

- Cognition
- Bone mineral density

Summary

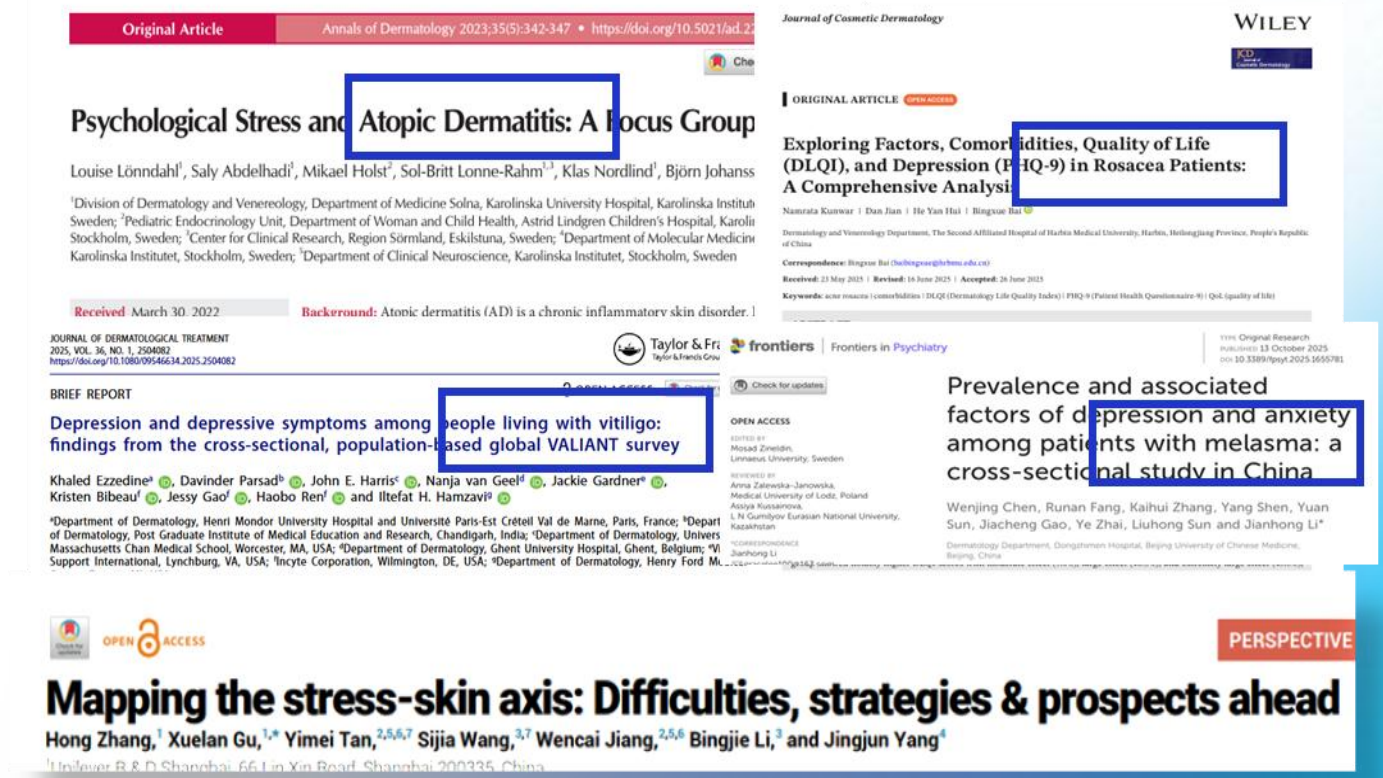
- **Looking old for one's age associates with:**
  - Cataracts, age-related hearing loss.
  - Osteoporosis and bone-mineral-density
  - Cognition and dementia (12 years into future)
  - Longevity (12 years into future)
  - Rate of ageing in a younger cohort.

- A.I. predictions will make further study easier.
- Explainable A.I. will help identify key features linked to individual health conditions.

Mind & Skin: further insights

Psychological stress & skin conditions

The reciprocal relationship between stress and skin diseases



Original Article

Psychological Stress and Atopic Dermatitis: A Focus Group

Louise Lönndahl, Saly Abdelhadi, Mikael Holst, Sol-Britt Lonne-Rahm, Klas Nordlind, Björn Johanss

Received March 30, 2022

Journal of Cosmetic Dermatology

WILEY

ORIGINAL ARTICLE

Exploring Factors, Comorbidities, Quality of Life (DLQI), and Depression (PHQ-9) in Rosacea Patients: A Comprehensive Analysis

JOURNAL OF DERMATOLOGICAL TREATMENT
2025, VOL. 36, NO. 1, 2504082

BRIEF REPORT

Depression and depressive symptoms among people living with vitiligo: findings from the cross-sectional, population-based global VALIANT survey

Khaled Ezzedine, Davinder Parsad, John E. Harris, Nanja van Geel, Jackie Gardner, Kristen Bibeau, Jessy Gao, Haobo Ren and Iltefat H. Hamzavi

frontiers | Frontiers in Psychiatry

OPEN ACCESS

Prevalence and associated factors of depression and anxiety among patients with melasma: a cross-sectional study in China

Wenjing Chen, Runan Fang, Kaihui Zhang, Yang Shen, Yuan Sun, Jiacheng Gao, Ye Zhai, Liuhong Sun and Jianhong Li*

OPEN ACCESS

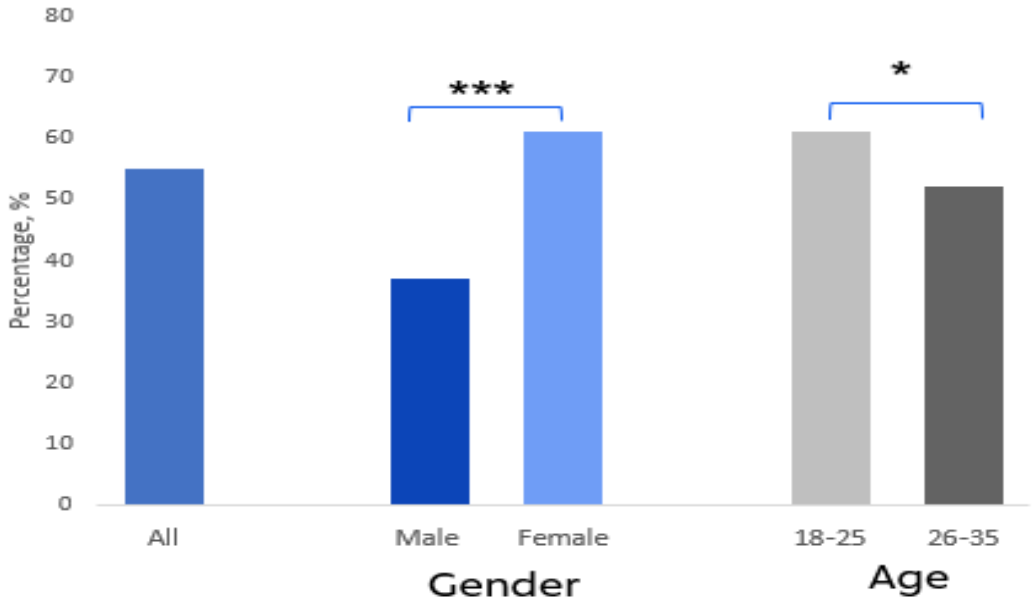
PERSPECTIVE

Mapping the stress-skin axis: Difficulties, strategies & prospects ahead

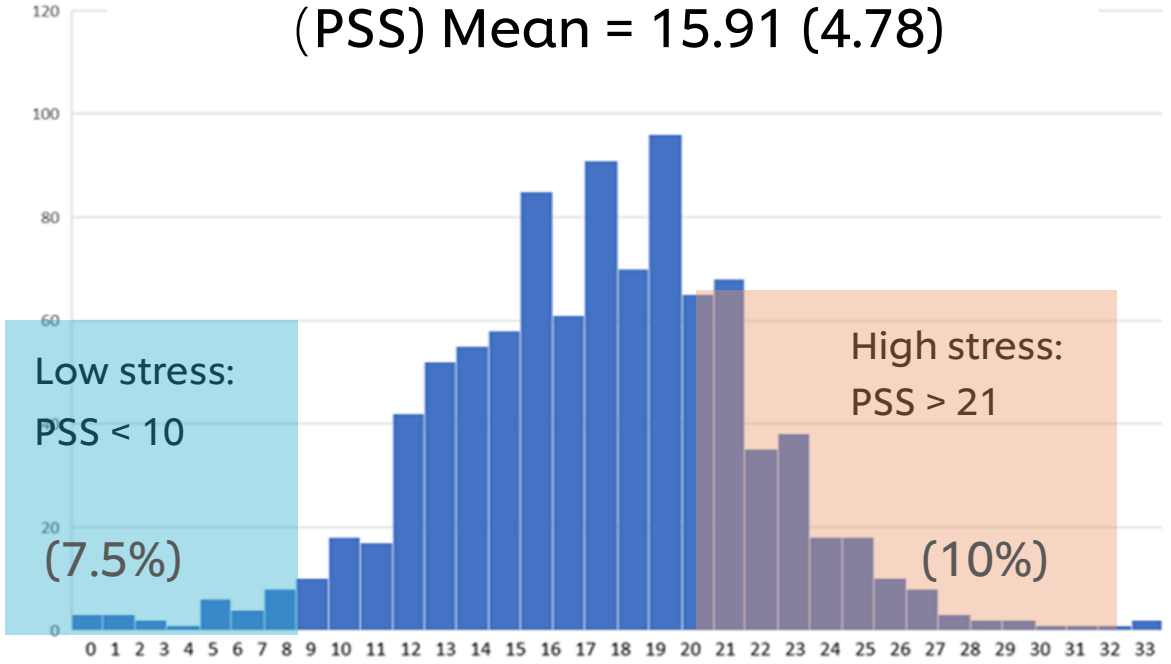
Hong Zhang, Xuelan Gu, Yimei Tan, Sijia Wang, Wencai Jiang, Bingjie Li, and Jingjun Yang

Stress assessments in a Chinese population.

Experience Problems under Stress (Gender, Age difference)

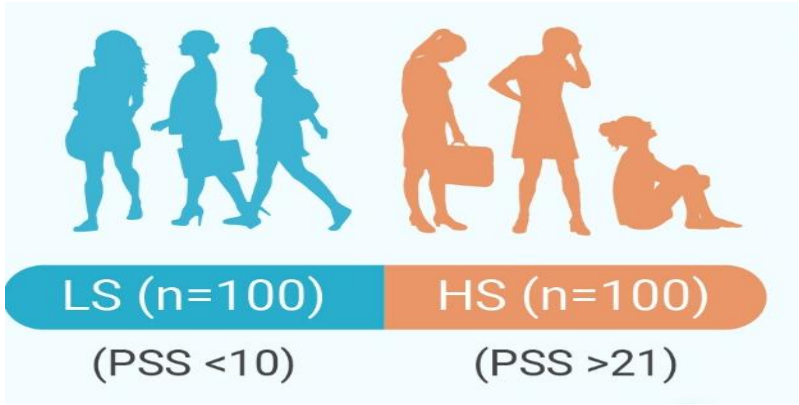


Assessment of Perceived Stress Scale (PSS) Mean = 15.91 (4.78)

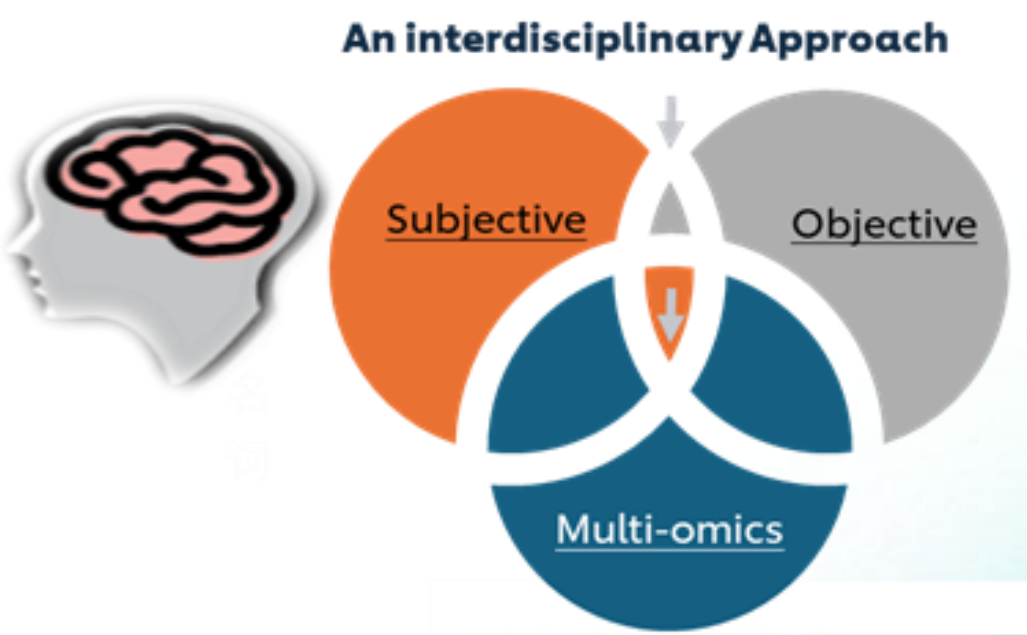


- Online questionaries survey
- N=954, Shanghainese, 18-35 years old
- IRB approval NO. 2020-22(R)

Stress and Skin Study



- Cross-sectional design
- n=200, Chinese females, 18-35 years old
- HGR registration No. 2022GH3740
- IRB approval No. 2021-28(R)



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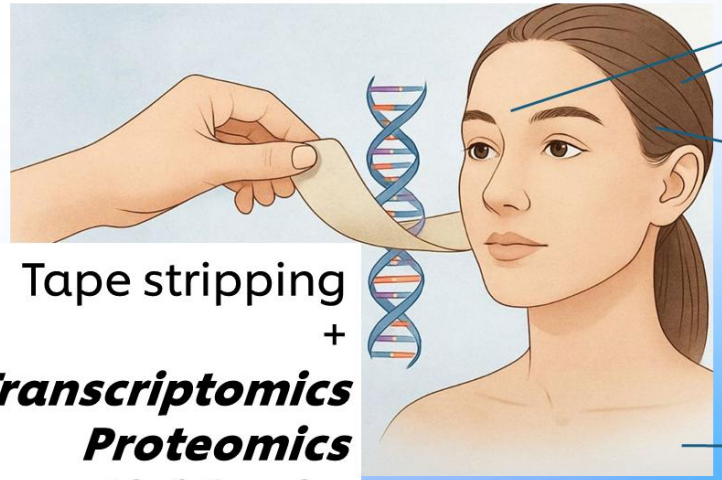
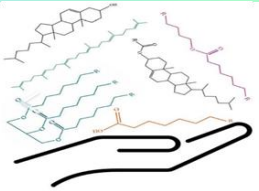
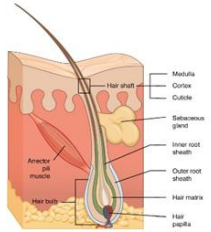


Tape stripping
+
Transcriptomics
Proteomics
Lipidomics
Microbiome

Sebum (scalp & skin)
Lipid analysis



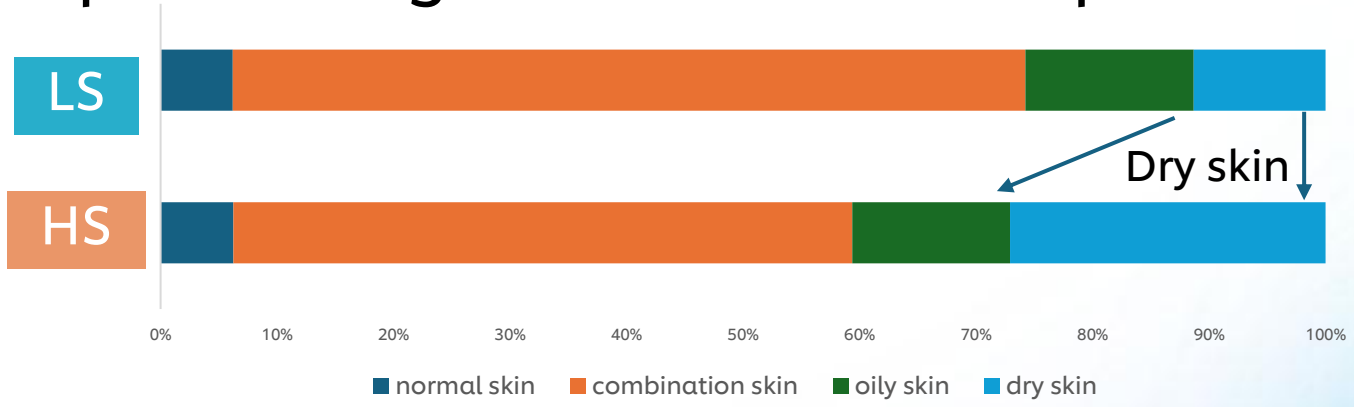
Hair Cutting & Plucking
Transcriptomics
Proteomics



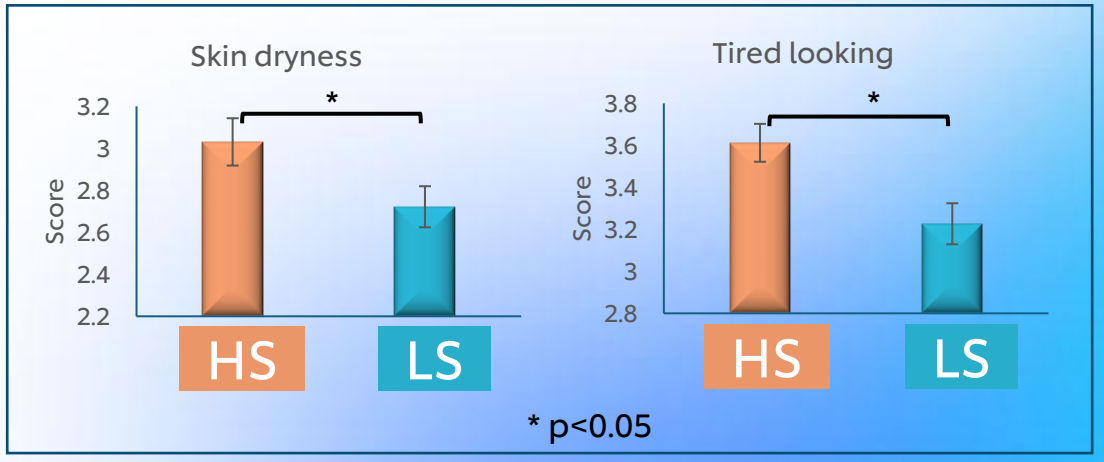
Blood sampling
Epigenetics
Proteomics

Stress and dry skin

People with higher stress are more prone to dry skin



Self-reported skin concerns



Stress and altered skin microbiome & barrier.

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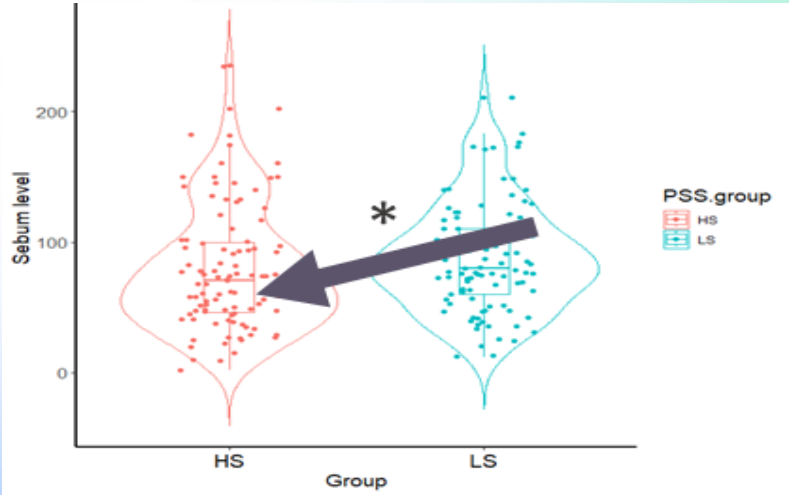
Chronic psychological stress associated with altered microorganisms

	High vs. Low
Cutibacterium	↓
Staphylococcus	↓
Acinomyces	↑
Chryseobacterium	↑

Stress associates with lower sebum casual level and alters lipid profile



	High vs. Low
Sebum casual level	↓
Lipid components	↓

Skin Microbiome & Psychological Stress

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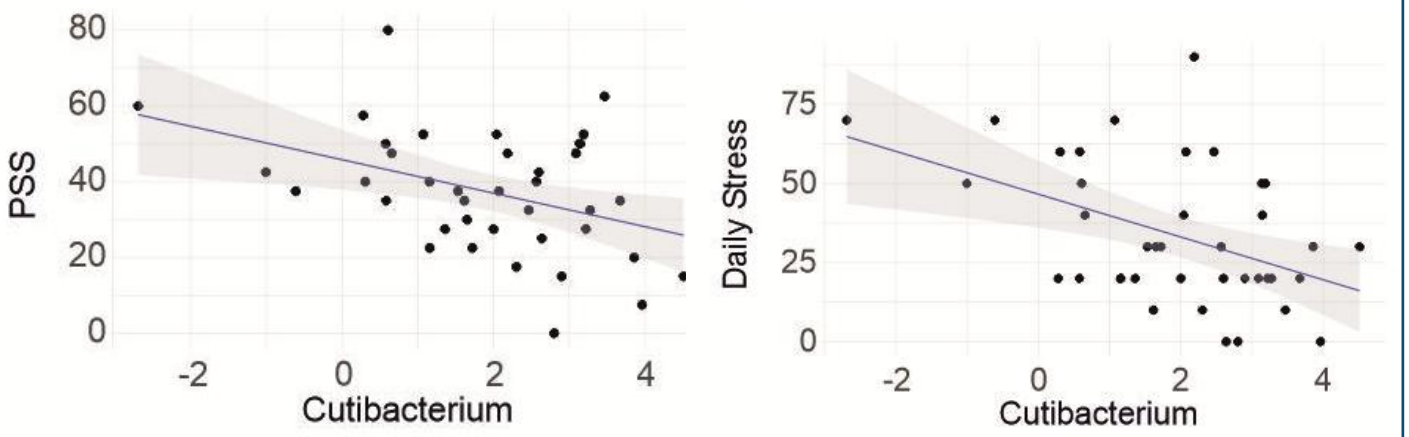
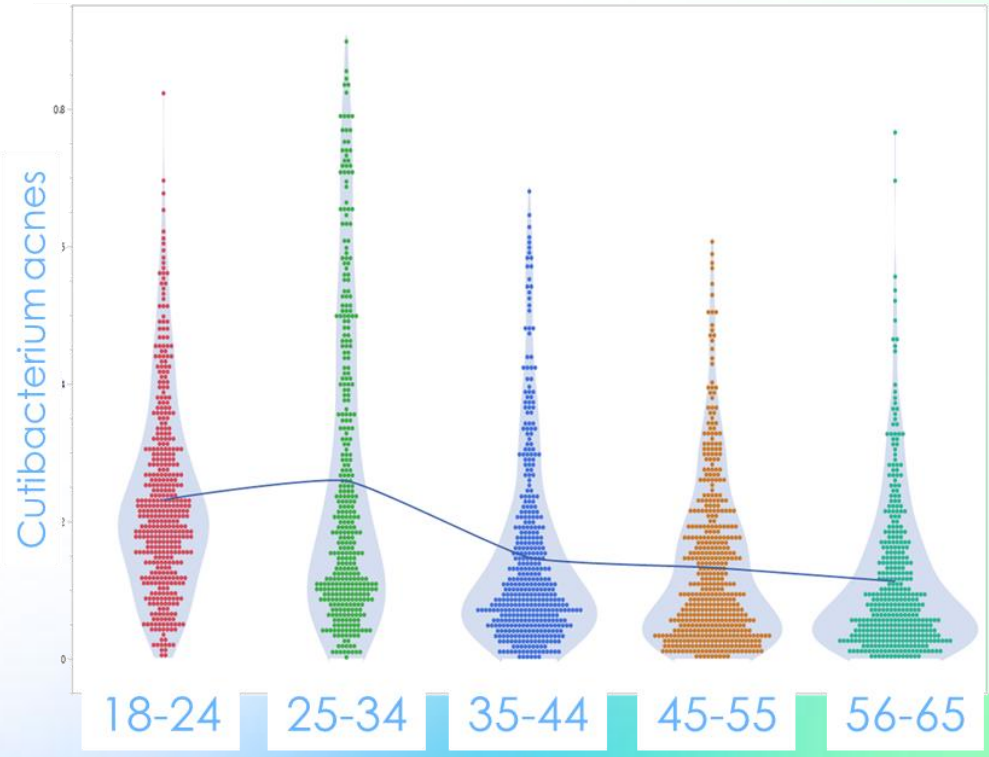
Elevated stress linked to a decrease in skin Cutibacteria



57 subject (29 women/ 24 men)
Mean age 63yrs +/- 12yrs

Tyson-Carr et al 2025



Unilever Data

Body site-specific associations between human skin microbiome composition and psychological wellbeing

John Tyson-Carr,[1] Joy Leng,[2] Margaret Scott,[3] Suzi Adams,[3] Michael Hoptroff,[3] Barry Murphy,[3] Nick Fallon,[1] Steve Paterson,[2] Anna Thomas,[3] Timo Giesbrecht[3] and Carl Roberts[1]

Summary

Psychological stress links with skin

- Inflammatory and autoimmune dermatological conditions.
- Dry skin and altered barrier.
- Altered skin microbiome.

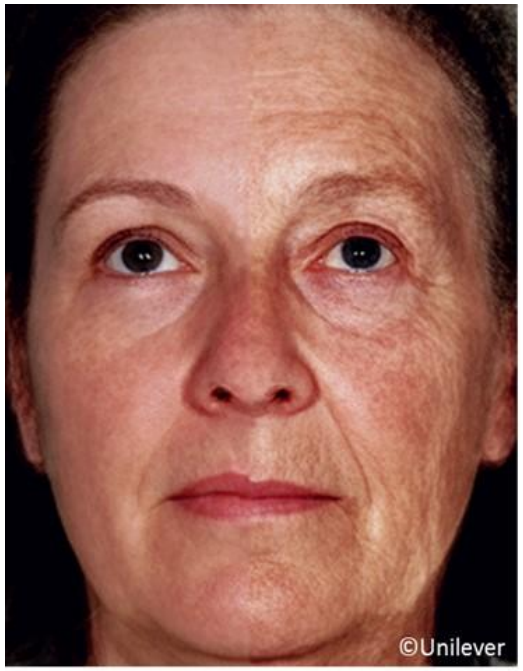
Overall Summary

- Perceived facial age and health links compelling but complexities exist.
- More reproducible longitudinal data in more diverse populations required.
- Challenges on study costs.
- A.I. predictions and explainable A.I. will help.
- Psychological wellbeing important.
- Skin appearance links to lifestyle changes and PC product-use needs further study.

Table 4. Odds of Having Higher Microtopography Grades in 1996 Relative to 1992, by Sunscreen

Intervention	Model 1	
	Odds of 1996 Compared With 1992 (95% CI)†	*P* Value
Sunscreen‡		
Daily sunscreen	1.19 (1.00–1.41)	0.046
Discretionary sunscreen	1.56 (1.29–1.88)	<0.001
Relative odds, daily sunscreen/discretionary sunscreen	0.76 (0.59–0.98)	0.033

Acknowledgements



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