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Pooling longitudinal studies of ageing for epidemiological analyses and to model health futures: the DYNOPTA project

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REVES Conference, Copenhagen, May 26-29, 2009

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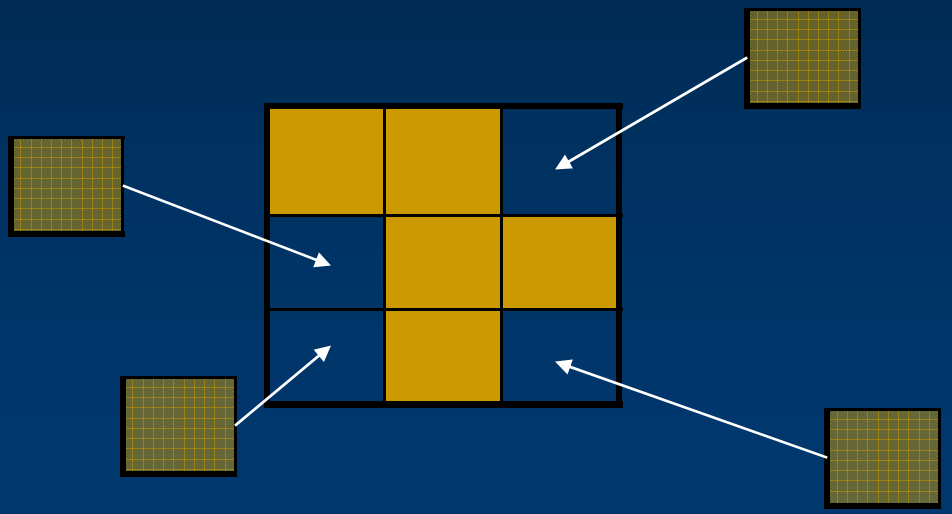
DYNOPTA – Dynamic Analyses to Optimize Ageing Well

Collaborative, multidisciplinary project among 9 institutions

DYNOPTA involves the creation of a pooled dataset from nine existing Australian Longitudinal Studies of Ageing

Dataset is being used to answer key questions about the compression of morbidity in late life



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Aims

Pool and harmonise data from existing studies (*N* = 50652)

Develop microsimulation model

Epidemiological, demographic and psychological analyses of 4 key theme areas

Forecast, simulate interventions, costings

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Key outcomes

- Cognition and Dementia
- Sensory function
- Mental Health
- Mobility/disability
- Mortality/longevity

Cross-Theme Issues

- Multiple morbidity
- Healthy ageing
- Gender
- Social determinants
- Risk factors

Advantages of data pooling

Individual Studies	Pooled Data
Lack statistical power for comparisons among particular groups	Increased statistical power for analysing: Low-prevalence disorders Co-morbidities Sub-populations
Restricted to localised samples	More representative study population

DYNOPTA – Locations

Establishment of research infrastructure and pooled dataset

DYNOPTA website for communication

Development of harmonization techniques

Creation of the pooled dataset

- 450+ harmonized variables using the by fiat method
- Some projects in progress on latent variable approach to harmonization

Data dictionary, harmonization manual, syntax archive, quality checking procedure, error reporting form

Re-releases of data

Steering committee

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The DYNOPTA Sample

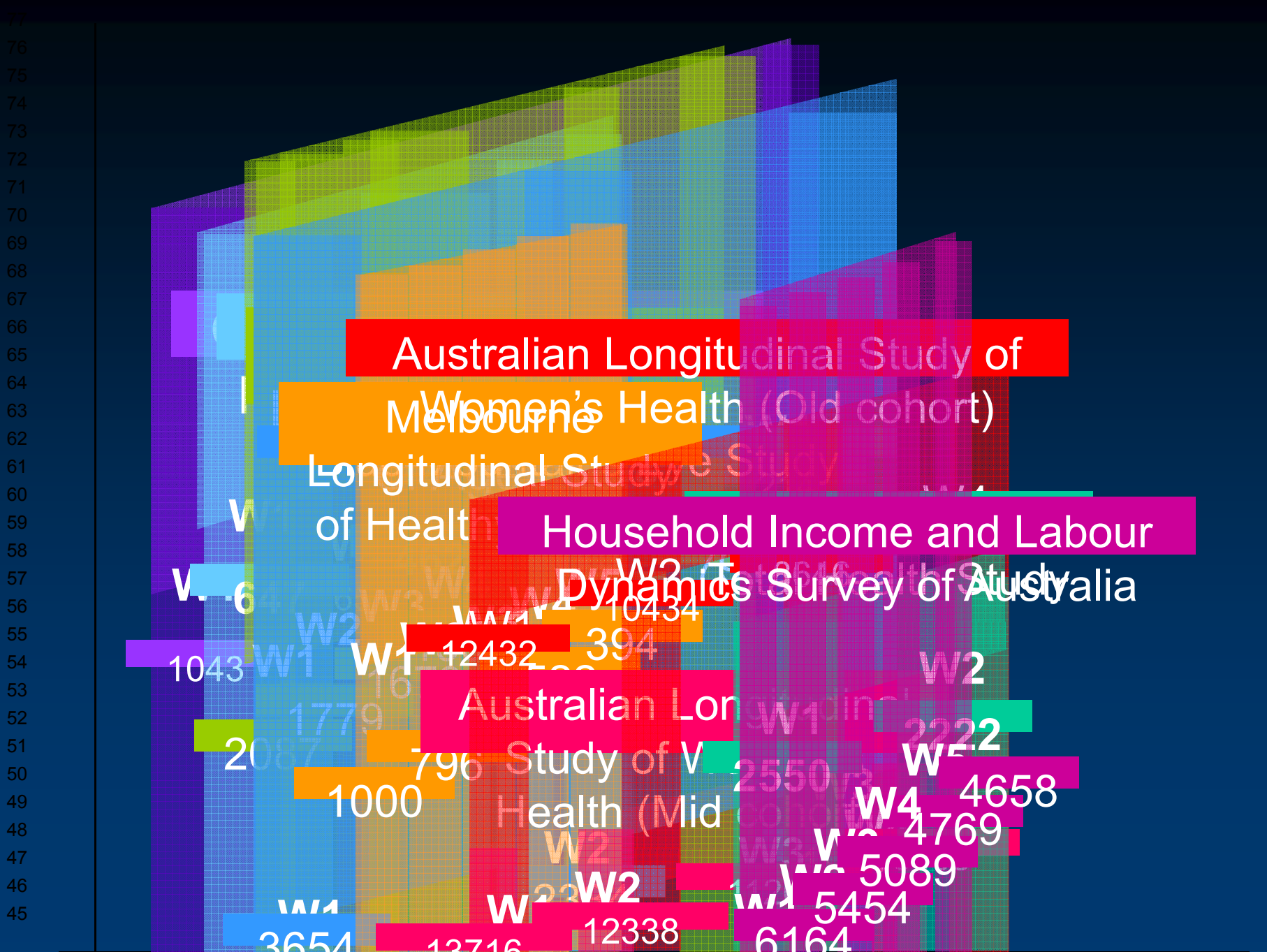
Collection period 1990 – 2006

Sample Size

- Observation 1: N = 50681 (77.2% Female, 9 contributing studies)
- Observation 2: N = 40851 (79.1% Female, 9 contributing studies)
- Observation 3: N = 30003 (84.5% Female, 7 contributing studies)
- Observation 4: N = 25378 (86.6% Female, 6 contributing studies)
- Observation 5: N = 6223 (54.1% Female, 2 contributing studies)
- Observation 6: N = 791 (57.6% Female, 1 contributing study)

Average number of observations per case = 2.9

Average number of observations for cases where: totalobs > 1 = 3.3


Australian Longitudinal Study of Women's Health (Old cohort)
Melbourne Longitudinal Study of Health
Household Income and Labour Dynamics Survey of Australia
Australian Longitudinal Study of Women's Health (Mid
W1
W2
W3
W4
10434
12432
12338
4658
4769
5089
5454
6164
3654
1043
1779
1000
2550

Harmonisation Considerations

Different wording in similar items

- *'what is your current marital status?'*
- *'what is your formal registered marital status?'*

Different reference points for similar items

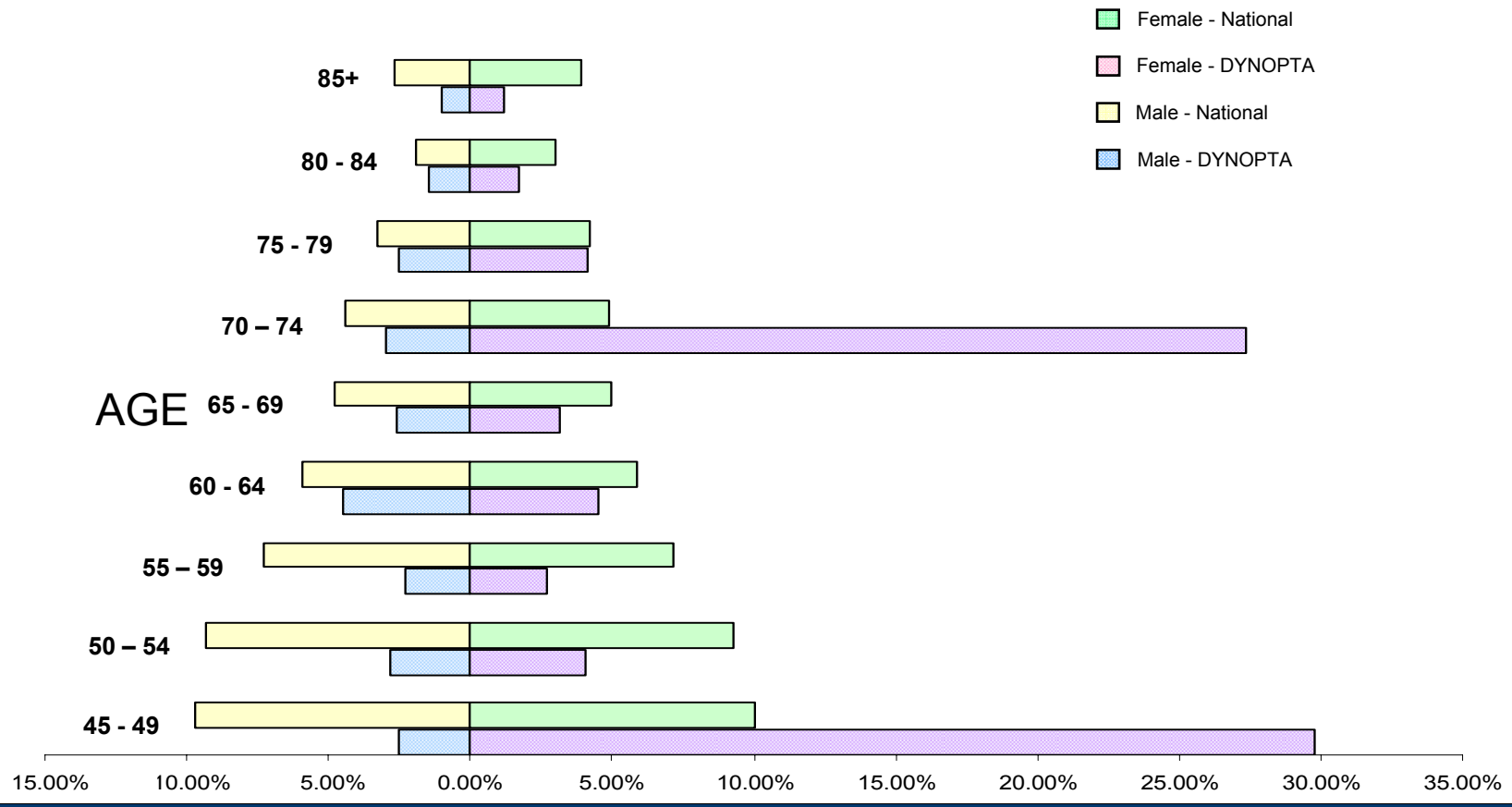
- *'In the last two weeks how often did you do vigorous exercise?'*
- *'In a normal week how often do you engage in vigorous exercise?'*

Different response sets across studies (and within studies across waves)

Different coding of variables within/across studies

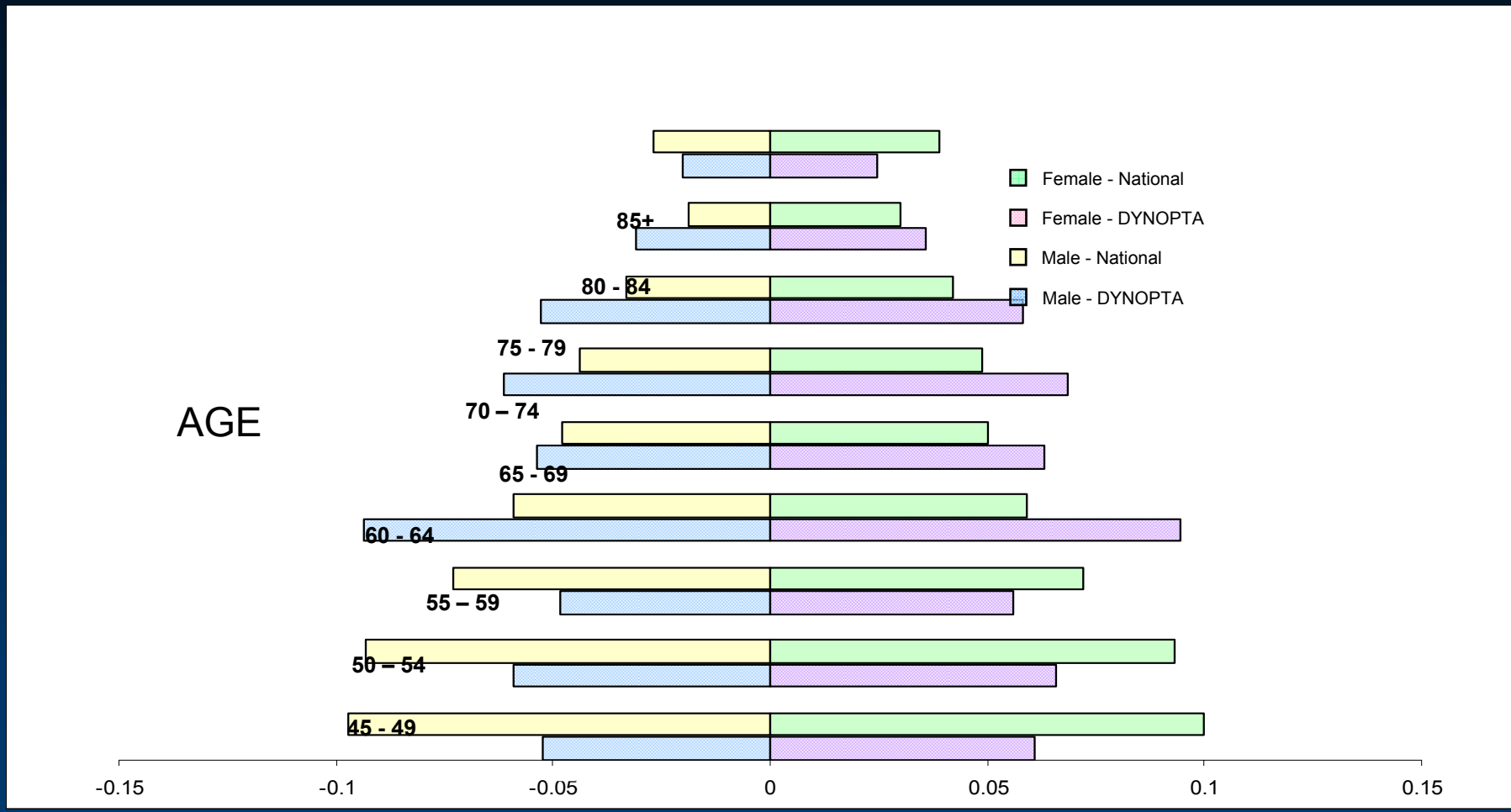
Aim to derive cutoffs consistent with national guidelines eg. Alcohol recommendations NHMRC, Active Australia cutoffs for physical activity, MMSE cutoff, CES-D cutoff

Sex by Age Comparison to 2001 Census Data



Population %

The DYNOPTA Sample: Sex by Age Comparison to 2001 Census Data (excluding ALSWH)



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Example Epidemiological work

Driving status

- Examined driving status among men and women
- Driving status by geographical region
- Cognitive and visual impairment and driving status
- Evaluation of Age-Based Testing (ABT): Australian states differ in the licensing of older drivers. Enables comparison of driving status between regions with different ABT, adjusting for demographic variables, MMSE and visual acuity.
- Policy implications from driving status research.

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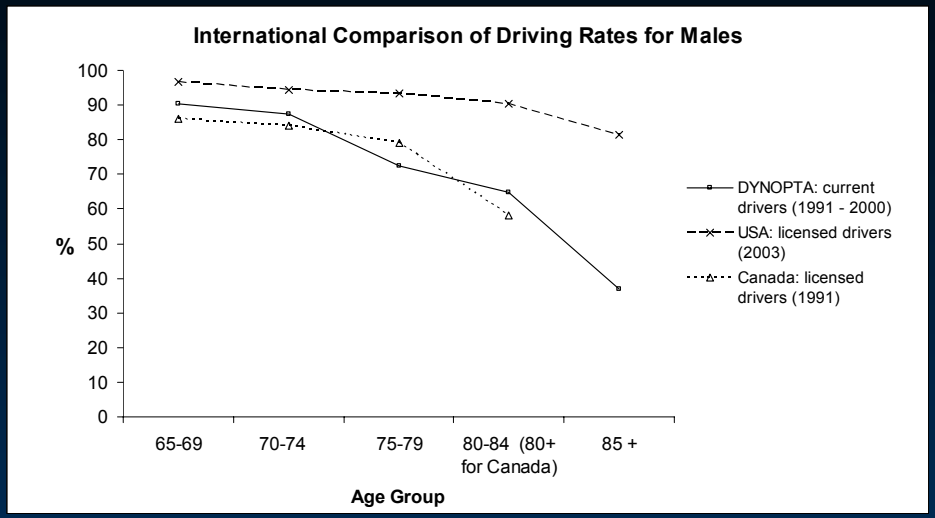
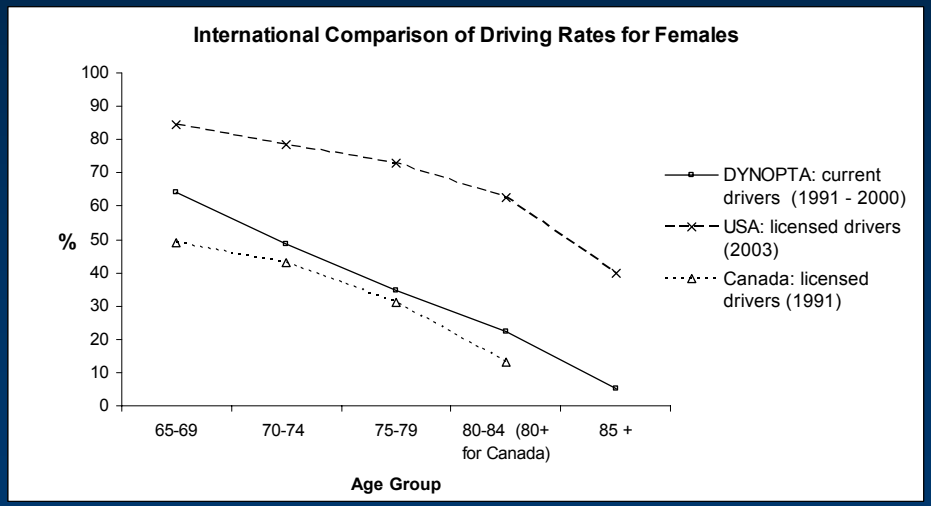
Findings on driving status

- Men 5.7 times more likely to drive than women
- Married/partnered 1.25 times more likely to drive
- 42% men with probable dementia and 11% of women with probable dementia were drivers
- 57% of men and 26% of women with visual impairment (worse than 6/12) were drivers
- Patterns of driving similar between Australia and Canada.
- US results show more drivers at older ages

International comparisons on driving status





Ross, L. Anstey, K.J. Kiely, K. Byles, J. Luszcz, M.A. Mitchell P. (in press) Older Drivers in Australia: Trends on Driving Status and Cognitive and Visual Impairment *Journal of the American Geriatric Society*

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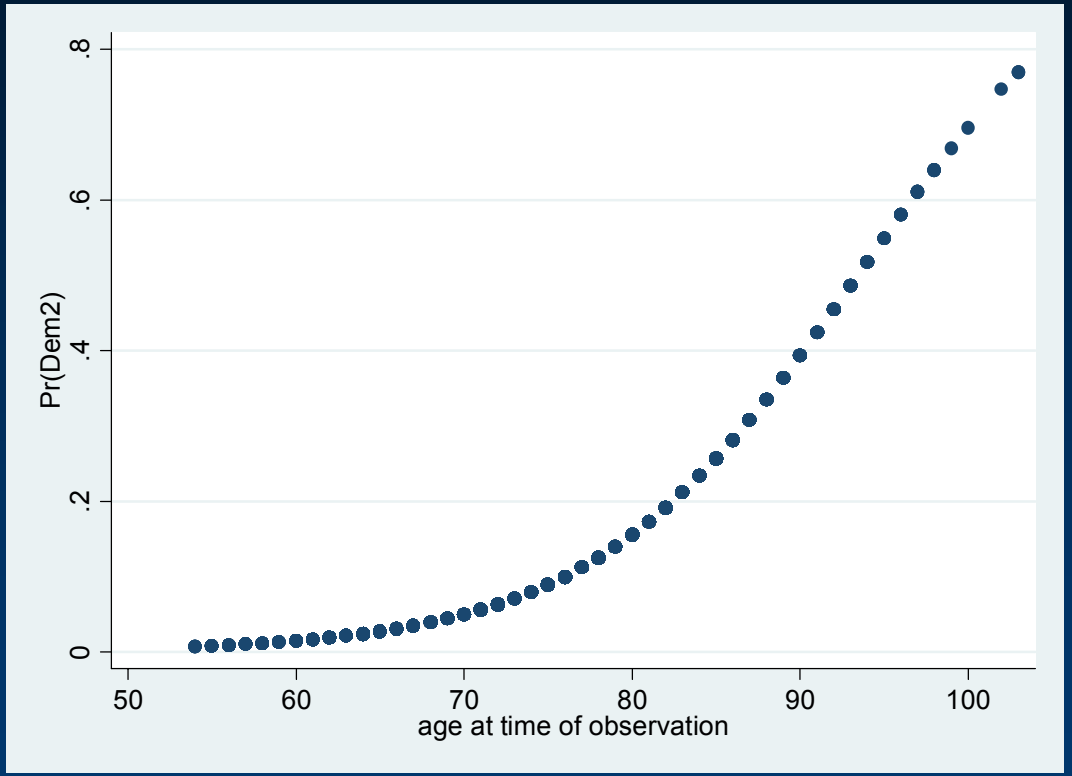
Smoothed probability of dementia for males by age for DYNOPTA pooled dataset



Cognitive impairment free LE (Carol Jagger)

Estimates derived from IMACH

Used DYNOPTA data from 3 studies

MMSE 0-23 = Cognitive Impairment/probable dementia

MMSE 24-30 = Cognitive impairment free

Other potential data sources to add later

Analyses separately for males and females

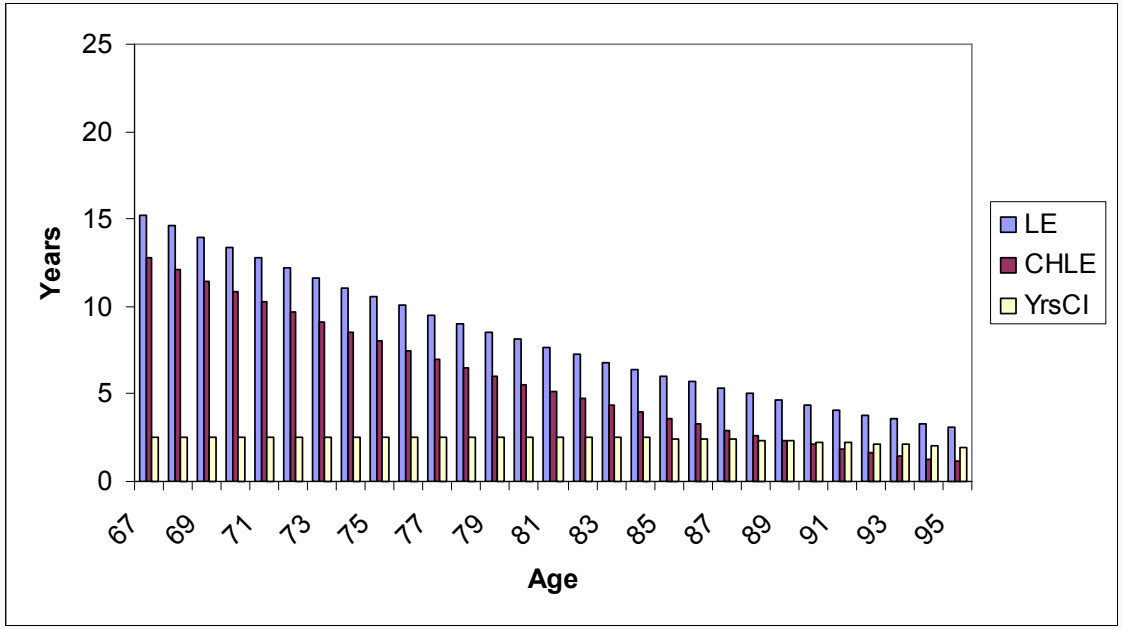
Preliminary, unweighted, assume single population

8 waves of data

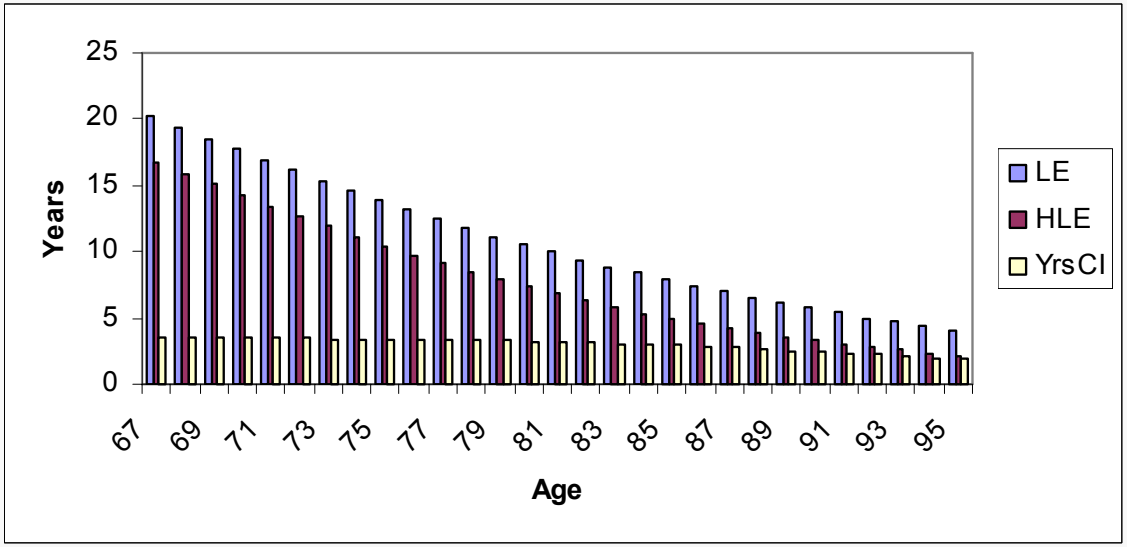
1992-2003

Preliminary IMACH estimates of Life Expectancy and Cognitive Disability Free Life expectancy (1992-2003, 9 waves)

Males (n = 1911)



Females (n = 1941)



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Future work

- Calculation of transition rates in 4 outcome areas
- Calculation of health expectancies
- Epidemiological analysis of risk factors for 4 outcome areas
- Dual change score modelling of related domains eg. cognition and depression, vision and memory
- Microsimulation modelling
- Demographic analysis of trajectories of partner status
- Measurement models of latent variable depression
- Development of imputation methods – cold deck for education etc.
- Testing models of healthy ageing

DYNOPTA team

Principal Investigator: Kaarin Anstey (Professor, Ageing Research Unit, ANU)

Chief investigators:

Heather Booth, Associate Professor, Australian Demographic Research Institute
Laurie Brown, Professor, NATSEM, University of Canberra
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David Steel, Professor, Statistics, University of Wollongong

Further information

Anstey, K. J., Byles, J.E., Luszcz, M.A., Mitchell, P., Steel, D, Booth, H., Browning, C. Butterworth, P. Cumming, R. Healy, J., Windsor, T. D., Ross, L. Bartsch, L., Burns, R. A. Kiely, K. Birrell, C.L., Broe, G. A. Shaw, J., Kendig, H. Cohort Profile: The Dynamic Analyses to Optimise Ageing (DYNOPTA) Project, (2009), *International Journal of Epidemiology* ***doi:10.1093/ije/dyn276***

www.dynopta.anu.edu.au

Acknowledgement of Funding

NHMRC/ARC Ageing Well, Ageing Productively Program Grant, NHMRC Senior Research Fellowship (Anstey).