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

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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
Aims

Pool and harmonize data from existing studies ($N = 50652$)

Develop microsimulation model

Epidemiological, demographic and psychological analyses of 4 key theme areas

Forecast, simulate interventions, costings
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

<table>
<thead>
<tr>
<th>Individual Studies</th>
<th>Pooled Data</th>
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<td>Lack statistical power for comparisons among particular groups</td>
<td>Increased statistical power for analysing:</td>
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<td>Low-prevalence disorders</td>
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<td>Co-morbidities</td>
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<td>Sub-populations</td>
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<td>Restricted to localised samples</td>
<td>More representative study population</td>
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DYNOPTA – Locations

Nation wide studies
- ALSWH
- AusDiab
- HILDA
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
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 $> 1 = 3.3$
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
The DYNOPTA Sample: Sex by Age Comparison to 2001 Census Data (excluding ALSWH)

AGE

Population %
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.
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

International Comparison of Driving Rates for Males

International Comparison of Driving Rates for Females

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)
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
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www.dynopta.anu.edu.au

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