Appendix F  The Dubbo Study of the Health of the Elderly

Study aims

The Dubbo Study began as a longitudinal community study of people born before 1930 living in the town of Dubbo, NSW. The study has classic epidemiological goals, namely to identify patterns and predictors of mortality, hospitalisation and need for residential care. It is a biomedical and social science investigation of healthy ageing, service use, delay of disability and age-related diseases such as cardiovascular diseases and dementia. The objective of the Dubbo Study is to contribute for policies and programs to improve the quality of life and quality of services for older Australians. Generally the research project will enable Australians to increase longevity and improve wellbeing in later life.

A new phase to the study began in 2000 to investigate Assets and Health Dynamics in an ‘old’ old population. The aim of this new phase was to model how three kinds of resources—income and assets, government entitlements and informal care services—modify expected changes in health or family circumstances in later life. The specific objectives were to model hospital use, residential care admission, informal community care, pension and benefit receipt, pharmaceutical benefit use and income and assets in an older cohort.

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Location of research

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Investigators

Directors of the study are Associate Professor Leon Simons and Professor John McCallum. Co-investigators are Ms Judith Simons and Professor Yechiel Friedlander.

Content

Broad outcomes of interest were mortality, hospitalisation and placement in long-term care, while the specific outcomes were cardiovascular disease, osteoporosis, disability and dementia. These were related to baseline characteristics such as lifestyle and dietary exposures (including doctor and self-prescribed vitamin supplements), pharmaceutical interventions and medical/family history (major foci), social class, income, education, physical activity and physical measurements. Data were also collected on hearing and vision, women’s health and mental health (e.g. depression).

One of the strengths of the Dubbo study was the inclusion of questionnaires examining life satisfaction, self-esteem and social involvement and support. Family and community contributions (including voluntary work) was also a major focus of the study.

AHEAD modelled hospital use, residential care admission, informal community care, pension and benefit receipt, pharmaceutical benefit use and income and assets in an older cohort. Data were also collected on employment, retirement, superannuation, expenses, housing and access to (and knowledge of) transport and other services.

Funding agencies/budget

Various NHMRC project grants since 1988 and private company research grants, an ARC Strategic Partnership with Industry Research and Training Grant for $498,707 from 1999, FaCS and industry partner Southern Cross Homes.
Data availability
Data will be available subject to privacy constraints by direct request to the study director.

Sampling (cohorts/sample size)
At baseline, from 1987, eligible subjects were identified through a reconciliation of GP and electoral records. The eligible study population was a single cohort of non-institutionalised residents of the Dubbo local government area who were born before 1 January 1930 and who attended a centrally located office for baseline medical and psychosocial assessment. A group of 2,805 residents (1,233 men and 1,572 women) aged 59–98 were first interviewed in 1988 and have been followed to the present with continuous ‘cold pursuit’ of death, hospitalisation and residential care data.
The study population are broadly representative of the Australian population born before 1930 by gender, age, employment, socioeconomic status, housing tenure, tobacco usage, mean blood pressure and other variables. However, 90% of the study population were Australian-born compared to 73% in the state of NSW as a whole.

Response rate
Based on a reconciliation of family doctor and electoral records, it is estimated that 73% of those eligible (2,805 people) participated in the study. At Wave 2, 1,089 participants completed face-to-face interviews, with 401 of these participants completing a reduced version of the questionnaire. The remaining participants were either deceased, unable to be contacted or were too ill to participate.

Incentives
No incentives have been provided to participants.

Timeframes
A 15-year longitudinal study with data collections in 1988, 2000 and 2002-2003. At baseline, from 1987, eligible subjects were identified through a reconciliation of GP and electoral records. Examinations and interviews extended from late August 1988 over a period of 13 months.

Methods and data collection
The Dubbo Study adopted an epidemiological approach to identifying risk factors and predictors of service use. The measures of risk factors were taken at a baseline point in time rather than proximate to admission.
Hospital, hostel and nursing home admissions in Dubbo were routinely collected as a part of the research program since late 1988 and this is ongoing. Services provided outside Dubbo
were tracked by two-yearly questionnaires and data collected from other hospitals, health and aged care services.

The medical examination included anthropometry, blood pressure, resting electrocardiogram (ECG), peak expiratory flow, and blood testing for lipids and glucose. A questionnaire explored social support, self-rating of health, functional health as ADLs and depression status (Center for the Epidemiologic Studies—Depression (CES-D)) and was administered by trained interviewers. It also covered demographics, education, alcohol and tobacco use, medications, past medical history and chest pain among other things.

In 2002–2003 approximately 100 interviews were conducted by phone, where participants had moved from the local area.

A unique feature of the Dubbo Study was gaining participants’ consent to undertake record linkage to service provider databases. DoHA and the Health Insurance Commission (HIC) are currently compiling a dataset of records from the Pharmaceutical Benefits Scheme and Medicare. The Department of Veterans’ Affairs has permitted the identification of veterans within the study population, and FaCS has provided information pertaining to pensions and assets records. The NSW Probate Registry has also given access to the records of the deceased for the purposes of the study.

Methods and measures employed have been described in detail in earlier publications:


Data analysis

Analysis of hospital and residential care has been completed. Pension and assets data, as well as data on GP and pharmaceutical usage, are currently being analysed. Analysis of Wave 3 data will be undertaken in conjunction with the record linkage data.

See publications for more information on data analyses.

Results

Various—see publications.

Outputs

See <www.dubbostudy.org/dubbostudy.nsf/main/Publications> for a list of Dubbo publications.
Related studies

There have been one-off collections of community and post-acute care services and other data, such as on organic depressions, as part of separately funded projects.

AHEAD is set within the Dubbo cohort, and is a comparative study of Australia, the European Community, Japan, US and UK, modelling what older people do with their income and assets when their health and family circumstances change.

References


Appendix G Melbourne Longitudinal Studies on Healthy Ageing Program

Study aims

La Trobe University in partnership with The University of Sydney is conducting a series of three linked studies that form a large longitudinal study on healthy ageing: The MELSHA Program. The three studies that form the program are:

- **HSOP Project**—the aim of this baseline study was to investigate the health, health behaviours and service use of a representative group of older people living in Melbourne.
- **HBOA Project**—this study was a follow-up of the HSOP sample and focused on biannual health behaviour change and continued annual measurements of functional ageing, health, and service outcomes.
- **FAHS Project: A Longitudinal Outcomes Study**—this study continues the follow-up of the HSOP sample and aims to provide a comprehensive knowledge base on ways in which functional ageing, medical conditions, and health behaviours influence the health, wellbeing and service use and survival of older people. It will describe annual changes in these outcomes areas and test hypotheses that explain improvement or deterioration in multiple aspects of ageing.

The large sample and long duration will identify rare outcomes and gender, socioeconomic, and other sources of variability.

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Investigators

The Program Directors are Associate Professor Colette Browning, School of Public Health, La Trobe University and Professor Hal Kendig, Dean and Professor, Faculty of Health Sciences, University of Sydney and Adjunct Professor, La Trobe University. The multidisciplinary research team for the three related studies has included psychologists, sociologists, medical researchers, occupational therapists, physiotherapists and public health researchers.

Principal investigators of HSOP included Professor Hal Kendig, Associate Professor Colette Browning, Professor Rob Helme (Associate, National Ageing Research Institute, The University of Melbourne). Associate investigators included Professor Leon Flicker (Geriatric Medicine Unit, Royal Perth Hospital) and Ms Karen Teshuva (Australian Institute for Primary Care, La Trobe University).

Principal investigators of HBOA included Professor Hal Kendig, Associate Professor Colette Browning, Professor Meg Morris (School of Physiotherapy, La Trobe University) and Professor Birgitta Lundgren-Lindquist (School of Health Sciences, Jönköping University, Sweden).

Principal investigators of FAHS include Professor Hal Kendig, Associate Professor Colette Browning, Professor Maria Fiatarone Singh (School of Exercise and Sports Medicine, University of Sydney), Associate Professor Susan Quine (Department of Public Health and Community Medicine, University of Sydney), Professor Shane Thomas (School of Public Health, La Trobe University), Associate Professor Carolyn Unsworth (School of Occupational Therapy, La Trobe University) and Dr Yvonne Wells (Australian Institute for Primary Care, La Trobe University).

Content

HSOP collected data on medical conditions including continence, musculoskeletal and cardiovascular disease, falls and injuries, confusion, pain, medication use, depression and mental health, health behaviours (nutrition, exercise, social activity), wellbeing and service use (health services, community services, and residential care).

HBOA focused on biannual health behaviour change and continued annual measurements of functional ageing, health and service outcomes.

FAHS attempted to identify the most important factors that precipitate disability onset, service use, duration of care at home after disability onset, and predictors of entry to residential care.
Funding agencies/budget
The program has received funding primarily from VicHealth and the NHMRC over the period 1994–2005. However, in 2002 the Faculties of Health Sciences at La Trobe University and The University of Sydney contributed $20,000 of matched funding for data collection on core variables (follow-up telephone survey) that year. HSOP 1994–1997: $532,743 VicHealth Project Grant, HBOA 1998–2000: $161,500 NHMRC Project Grant, FAHS 2003–2005: $215,465 NHMRC SRDC Healthy Ageing Project Grant. ARC Small Grants were received to fund add-on components of the main study — 1994–1996: $39,000; 1997: $12,000; 1999–2000: $10,000.

Data availability

Sampling (cohorts/sample size)
HSOP included 1,000 participants aged 65 and over (average age 73) living in Melbourne. HBOA and FAHS were follow-ups of the original HSOP sample. All subjects first surveyed ten years earlier will have entered the critical age group of 75 years and over by 2004. See Response rate for the number of participants included in each wave of the project.

Response rate
The following number of participants were included in each wave of the study — Wave 1: 1,000, Wave 2: 906 Wave 3: 796, Wave 4: 718, Wave 5: 649, Wave 6: 611, Wave 7: 541, Wave 8: 424, Wave 9: 386.

Incentives

Timeframes
Methods and data collection

HSOP—This data collection formed the baseline for the MELSHA Program. Wave 1 included a face-to-face interview (with a proxy if necessary) to gather data on health, health behaviours and service use. A self-completed questionnaire covered attitudes and life histories. A clinical examination (and possibly researcher observations) conducted in the home measured variables such as weight, height, eyesight and hearing. Waves 2 and 4 involved a brief mail-out questionnaire (with a phone call or visit where necessary) to collect change and limited outcome variables. Wave 3 used Computer Assisted Telephone Interviewing (CATI) to collect follow-up data on core variables.

HBOA—Focused on biannual health behaviour change and continued annual measurements of functional ageing, health, and service outcomes including follow-up where necessary through home visits, proxies, and/or death registry checks. Waves 5 and 7 used CATI, and Wave 6 involved a brief mail-out questionnaire. Another CATI on core variables was conducted in Wave 8 using funding received from La Trobe University and The University of Sydney.

FAHS—This study continues the follow-up of the original HSOP sample. Wave 9 involved a brief mail-out questionnaire. Waves in 2004 and 2005 will involve CATI and a brief mail-out questionnaire, respectively.

Data analysis

Results

Outputs

Related studies
MELSHA is a series of three linked studies.

References
Appendix H The Sydney Older Persons Study

Study aims
This study was conceived in 1988 as the Sydney Older Veterans Health and Services Project to investigate the health of community dwelling veterans of World War II. SOPS commenced in 1991. At this stage, non-veteran members of the community were included as well.

SOPS Stage 4: MRI correlates of memory functioning in normal ageing
The aim of this study was to define cognitive and structural correlates of ‘normal’ brain ageing, with the specific purpose of investigating whether volumes of the hippocampus are selectively correlated with age-related memory performance.

SOPS Stage 4: Neuropsychology of ageing and cognition: changes in executive functions
The aims of this study were to provide a better understanding of the impact of age, environmental factors and illnesses on these executive functions in older people. The participants who took part in the MRI phase of the study were recruited for this study. They underwent extensive neurological and neuropsychological assessment, and were asked questions about their medical history, current and past health and lifestyle.

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Location of research

Australia, NSW, Sydney

Investigators

Research is conducted by the CERA of Concord Hospital and at the Prince of Wales Medical Research Institute. Principal investigator is Professor Tony Broe from the Prince of Wales Medical Research Institute. Other investigators from the Prince of Wales Medical Research Institute include Professor Glenda Halliday, Dr Bill Brooks, Dr Tony Harding, Dr Hayley Bennett and Dr Olivier Piguet. Investigators from CERA include Dr Louise Waite and Dr Helen Creasey. Associate Professor Dave Grayson is from the University of Sydney. Other investigators include Dr Jillian Kril.

Content

Medication use; disease; disability; service use; dementia; mortality; life satisfaction and depression; carer distress; alcohol, smoking and physical activity; and laboratory results.

Funding agencies/budget

The study has received regular funding since 1992. Submissions are still being made for funding for ongoing work and analysis relating to the SOPS study sample and accumulated results. There has also been some matched funding.


Data availability

Data are available to approved researchers and the SOPS study has shared research in Australia and overseas.
Sampling (cohorts/sample size)

The sampling design involved two random samples: a Department of Veterans’ Affairs listing yielded 327 subjects (133 females and 194 males, response rate 82.4%) and a community area-probability sampling scheme yielded 320 subjects (193 females, 127 males, response rate 69.9%). Both samples were obtained from the same geographic base delineated by the Central Sydney Area Health Service. Participants were aged between 75 and 98 years (mean age 80.9) in SOPS 1.

Response rate

Initial response rates for the veteran and non-veteran samples were 82.4% and 69.9% respectively. The research subjects have a high rate of ongoing participation in the project. The initial sample size (and sample size) at each stage of the study was: 647 (647), 462 (449), 367 (367), 346 (299) and 185 (123). SOPS 5 only interviewed people who had an MRI—a constrained sample of the 185 were available for interview.

Incentives

No incentives were offered at any stage of the research.

Timeframes

SOPS involves 5 waves of data collection, though specific with sub-groups of the surviving sample are expected to continue for the next three to five years.


Methods and data collection

SOPS involves 5 waves of data collection, though specific projects such as functional MRI studies, annual clinical follow-ups by questionnaire and related smaller-scale projects on gait disorder with sub-groups of the surviving sample are expected to continue for the next three to five years. Issues associated with frail ageing and the oldest old are now the primary focus of the study.

SOPS Stage 1

Stage 1 of the study involved visiting people in their homes and conducting medical and neuropsychological assessments. Participants were also asked questions about their health and lifestyle, and often a spouse, relative or friend was interviewed to provide further information.
SOPS Stages 2 and 3

The second wave of the study, SOPS Stage 2, involved extensive interviews in the homes of the original study participants. SOPS Stage 3 did not have the broad aims of the first two stages. Rather, it was a specific study based on the SOPS population that involved taking a blood sample and completing a medication history.

SOPS Stage 4

SOPS Stage 4 was a further follow-up of the original SOPS population using the same methodology and instruments used in Stages 1 and 2. This has allowed a broader timeframe over which to study the correlates of successful and unsuccessful ageing and the possible risk factors and protective factors for these.

MRI correlates of memory functioning in normal ageing

As part of the MRI study, 102 community-dwelling individuals aged over 80 years underwent MRI scanning of the brain as well as neurological and neuropsychological assessment. Volumes of the hippocampus, whole brain and intracranial region were calculated using a three-dimensional technique on an advanced software program developed in the US. Visual ratings of hippocampal size were also performed.

SOPS Stage 5

SOPS Stage 5 focused on the sub-group of subjects who had a MRI scan at SOPS 4. These people were re-invited to participate in a further MRI scan, detailed neuropsychological assessment and medical review. In addition, we re-interviewed the informants (such as a family member or a close friend) to measure the presence of health changes and their impact over time. It is anticipated that these data will provide invaluable information about the correlates and predictors of cognitive decline, with the potential to assist in the diagnosis of dementia and its sub-types.

Data analysis

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Results

Previous SOPS research findings

Disease, disability and service use

An increase in the number of diseases with increasing age is well recognised. The SOPS study found that this increase in disease was accounted for by the neurodegenerative illnesses, including disorders of gait and cognition, rather than conditions such as heart and lung disease, which did not increase in prevalence with advancing age. In our studies of
disability it was found that it was these neurodegenerative diseases which contributed most significantly to higher levels of disability. Furthermore, disability was the strongest predictor of service use within the study population. These findings highlight the significance of identifying neurodegenerative illnesses in older populations.

**Prediction of dementia**

When treatments become more readily available, the early detection of dementia will be increasingly important. Using the longitudinal data from the SOPS population, it has been found that the presence of mild cognitive deficits and abnormalities of gait can predict the subsequent development of dementia. Furthermore, when changes in both gait and memory are present there appears to be an even greater risk of developing dementia than when each is present singly. People with these mild changes in gait and memory also have an increased mortality and are more physically disabled. As identified in other studies the status of a gene called apoE also predicted the development of dementia.

**Prediction of mortality**

Many predictors of mortality have been identified using the longitudinal data from the SOPS study. These include the total number of illnesses, age, male gender, number of medications, number of falls and the presence of dementia and early cognitive deficits.

**Life satisfaction and depression**

Participants who had greater levels of disability and who had abnormalities of gait reported more depression and lower satisfaction with their lives. Disability was the strongest longitudinal predictor of depression. Levels of depression and life satisfaction remained relatively stable over time, reflecting both the chronicity of disease in this population and long-term personality traits.

**Carer distress**

Some study participants had significant disability, necessitating the need for a carer. Study participants who had carers had more illnesses and were more physically disabled. Carers providing greater levels of assistance were more likely to report symptoms of stress and depression. However, the main determinant of satisfaction with their caring role was determined by the nature and characteristics of their relationship with the study participant. Where the participant was perceived to be more controlling or domineering, the carer reported lower levels of satisfaction.

**Alcohol**

Around 10% of the study population drank alcohol in amounts that are defined as hazardous. While these people were not more disabled when seen at SOPS 1, they were longitudinally more likely to have an impaired ability to perform their day-to-day tasks. In contrast to other studies which have identified a protective effect from drinking alcohol, no reduction in mortality was identified in SOPS.
**Australian norms for the Boston Naming Test**

Another important result arising from the SOPS project is the publication of norms of naming ability in elderly Australians for a test known as the ‘Boston Naming Test’. Until now, most available norms had been obtained from overseas studies using objects not necessarily familiar to Australians. The publication of these norms specific to Australian elderly will help clinicians identify more accurately people who are developing a naming difficulty, which can be a sign of dementia, and who may therefore require further intervention.

**Laboratory results in the community**

Using the blood samples collected in SOPS 3 it was found that, in keeping with other international studies, a higher prevalence of Alzheimer’s disease was associated with the presence of the apoE e4 allele. Abnormalities in other biochemical and haematological parameters tested for were found to be due to disease and were not abnormal due to ‘age’. This suggests that in the presence of abnormal laboratory test results, a cause needs to be identified and that abnormalities cannot be attributed to age.

**SOPS Stage 4: MRI correlates of memory functioning in normal ageing**

The hippocampus is a curved structure extending through the temporal lobes of the brain, and is intimately involved in the neural processing of memory. It is known to be one of the brain structures most vulnerable to degeneration in Alzheimer’s disease. A decline in memory functioning is also a common complaint among healthy individuals of advanced age, and this is thought to be associated with an age-related decrease in hippocampal volume.

**The hippocampus and memory in normal ageing**

All hippocampal measures were identified as effective predictors of memory performance such that increasing hippocampal size was reflected in the form of superior memory function. This positive association between hippocampal size and memory persisted even when the influence of age-related illnesses (e.g. hypertension) and sociodemographic variables (e.g. education) was taken into account. Age and intelligence were also identified as significant predictors of verbal and visual memory in the study group. Importantly, the size of the hippocampus was not predictive of performance on non-memory tasks (i.e. information processing, language, visuospatial and executive tasks). This suggests that hippocampal size is not merely a marker of generalised cognitive decline, but rather is specifically related to the integrity of memory systems in individuals of advanced age.

**The hippocampus and memory in successful ageing**

Successful ageing is a term that has been used to describe optimally healthy older persons who remain cognitively intact and fail to exhibit signs of cognitive decline with advancing age. Using information collected from an informant, those individuals who had demonstrated evidence of mild cognitive decline over the previous three years were identified and excluded from the sample so that a subset of unambiguously healthy older persons could be defined. Analyses carried out on this sub-group of high-functioning
community dwellers provided further compelling support for the association between hippocampal size and memory function in the ninth and tenth decades of life. The findings of this study are thus at odds with previous suggestion in the literature that there is insufficient variation in hippocampal volumes in normal ageing for such structural-functional relationships to be demonstrated. Instead, our research suggests that the hippocampus is a critical structure for memory processing in both normal and successful ageing.

**SOPS Stage 4: Neuropsychology of ageing and cognition: changes in executive functions**

Increasing variability in performance on tests of cognitive functions with ageing is well documented. The current literature further suggests that the executive functions, which include aspects of cognition such as decision-making, planning, problem-solving and reasoning abilities, appear to be more sensitive to the ageing process with an earlier and more rapid decline. However, the underlying causes to this faster decline remain unclear.

In this group of non-demented elderly individuals, changes in executive functioning were mostly accounted for by the presence of signs and symptoms associated with the most common neurodegenerative diseases of ageing, such as Alzheimer’s disease, dementia associated with vascular-related disorders and dementia associated with movement disorders. When these ‘markers’ were taken into account, the portion of change in performance due to chronological age was very small. These results suggest that getting old is not synonymous with a decline in executive functions efficiency. In contrast, such a decline would indicate the possible presence of a neurodegenerative process which becomes more common as we get older.

Executive functions rely in part on the integrity of frontal-subcortical brain circuits for their activation. These circuits are also commonly affected by vascular dementia and dementia associated with movement disorders. Interestingly, in this study, although we hypothesised that the presence of ‘markers’ associated with these disorders would give rise to poorer executive functioning, this was not to be the case. It appears that, in addition to the specific frontal circuits, the integrity of the brain as a whole is as important a component for the successful activation of these very complex abilities.

**Outputs**


Piguet O, Grayson DA, Tate RL, Lye T, Bennett HP & Creasey H et al. (accepted March 2003). A model of executive functions in very old community dwellers: evidence from the Sydney Older Persons Study. Cortex


Related studies

Data from SOPS has been provided to Professor Kenneth Rockwood at Dalhousie University in Canada. This data have been used to develop, in collaboration with a number of research partners and data sets, a model of the accumulation of deficits in relation to ageing and mortality and the development of an index of frailty. The results are being presented for publication in 2004.

References