



Australian Longitudinal Study
on Women's Health

ANNUAL REPORT

2017

ISSN: 2653-3227

Australian Longitudinal Study
on Women's Health

Annual Report 2017



Australian Government
Department of Health

Contents

Directors' Report.....	3
Study Management Committee.....	5
Collaborators and Investigators.....	6
Current Students.....	14
Project Staff	17
2017 Major Report Future health service use and cost: Insights from the Australian Longitudinal Study on Women's Health.....	20
Research themes – 2017 outcomes.....	25
Publications	39
Accepted papers	79
Conference Presentations.....	81
Seminars and Workshops	88
Completed Student Projects.....	91
Data Archiving.....	98
Enquiries.....	99

Directors' Report

In 2017, the Australian Longitudinal Study on Women's Health (ALSWH) entered its third decade. Funded by the Australian Government Department of Health, ALSWH assesses women's physical and mental health, as well as socio-demographic and lifestyle factors, and their use of health services. The Study is a national research resource, and since its inception has provided an evidence base to the government and other decision-making bodies within Australia for the development and evaluation of policy and practice in many areas of service delivery that affect women. This report outlines the Study's progress and achievements during 2017.

ALSWH now involves more than 55,000 women in four cohorts that encompass the adult lifespan:

- Young women born 1989-95 (now aged 22-28 in 2017)
- Women born 1973-78 (now aged 39-43)
- Women born 1946-51 (now aged 66-71)
- Women born 1921-26 (now aged 91-96)

During the year, the 1989-95 cohort received their fifth survey, and women in the oldest cohort continued to receive surveys at six-monthly intervals, with surveys sent in May and November. Data collection for a major substudy of the 1973-78 cohort, [Mothers and their Children's Health](#)¹ (funded by the NHMRC), concluded in May with over 3,000 mothers from the 1973-78 cohort providing survey data on 5,780 children aged under 13 years. This data, which includes the children's diet, physical activity, sleep patterns, milestones, and the mother's use of childcare, will now be linked with ALSWH's 20+ years of data on the mother's health and socio-demographic factors to provide insights into child health and development.

In November, the Australian Research Council funded a new substudy, which will investigate healthy and successful ageing in women from the Study's 1946-51 and 1921-26 cohorts.

A major report examining Medicare services was prepared during the year for the Australian Government Department of Health. The report, 'Use, access to, and impact of Medicare

¹ <http://www.alswh.org.au/match-about>

services for Australian women: Findings from the Australian Longitudinal Study on Women's Health', adopts a life course approach to investigate changes in women's health and health service use across life stages. For the report, women's survey data was linked to Medicare Benefits Scheme (MBS) data and then analysed to provide detailed information on how and when women use health services throughout their lives, as well as the costs of services used. The report is available on the Study website, and a summary is included in this report.

We continued to conduct subsidiary analyses, enhance data quality and documentation, and produce scientific papers and conference presentations on all aspects of women's health. This year almost 60 publications using ALSWH data were published or accepted for publication, and over 50 presentations were made at national and international conferences. ALSWH covers a range of research themes and a brief summary of the publications arising from these themes during 2017 is included in this report.

Throughout the year we have continued to maintain and enhance data quality and documentation. ALSWH data can be linked to selected external datasets, including Medicare Benefits Schedule (MBS), Pharmaceutical Benefits Schedule (PBS) and other health datasets (such as Aged Care data, cancer data, and state-based hospital and perinatal data). We have continued to work on developing our linked data capacity and improving access to linked data.

We would like to thank the Department of Health for their ongoing support of the Study, our colleagues for all their hard work, and the women who have continued their participation in the research over the last 21 years.

Professor Gita Mishra

Professor Julie Byles



Study Management Committee

Professor Julie Byles

BMed, PhD

Director

Australian Longitudinal Study on Women's Health
Research Centre for Generational Health and Ageing
The University of Newcastle

Professor Gita Mishra

BSc, MSc, PhD

Director

Australian Longitudinal Study on Women's Health
School of Public Health
The University of Queensland

Associate Professor Leigh Tooth

BOccThy (Hons), PhD

Deputy Director

Australian Longitudinal Study on Women's Health
School of Public Health
The University of Queensland

Professor Deborah Loxton

B Psych (Hons), Dip Mgt, PhD

Deputy Director

Australian Longitudinal Study on Women's Health
Research Centre for Generational Health and Ageing
The University of Newcastle

Collaborators and Investigators

This list includes the first named investigator or collaborator from all currently active projects as recorded through the Expression of Interest process. For further information, please [visit the ALSWH website](#).

Dr Shazia Abbas

Research Centre for Generational Health and Ageing, The University of Newcastle

Prof Jon Adams

School of Public Health, University of Technology Sydney

Prof Rosa Alati

School of Public Health, The University of Queensland

Dr Amani Hamad Alhazmi

King Khalid University, Saudi Arabia

Prof Marie-Paule Austin

Perinatal and Women's Mental Health, University of New South Wales

Dr Alissa Beath

Macquarie University

Christie Bennett

School of Clinical Sciences, Monash University

Madeleine Berryman

The University of Newcastle

Jason Brandrup

Health Analytics Branch, Australian Government Department of Health

Prof Wendy Brown

Centre for Research in Exercise, Physical Activity and Health, The University of Queensland

Dr Rhonda Brown

School of Nursing and Midwifery, Deakin University

Dr Leanne Brown
The University of Newcastle

Prof Janet Cade
School of Food Science and Nutrition, University of Leeds

Alice Campbell
Institute for Social Science Research, The University of Queensland

Dr Sungwon Chang
University Technology Sydney

Dr Catherine Chojenta
Research Centre for Generational Health and Ageing, The University of Newcastle

Dr Hsin-Fang (Evelyn) Chung
Centre for Longitudinal and Life Course Research, The University of Queensland

Prof Flavia Cicuttini
Department of Epidemiology and Preventative Medicine, Monash University

Prof Lindy Clemson
Faculty of Health Sciences, The University of Sydney

Prof Clare Collins
School of Health Sciences (Nutrition and Dietetics), The University of Newcastle

A/Prof Reinie Cordier
Faculty of Health Sciences, Curtin University

Prof Hugh Craig
School of Humanities & Social Sciences, The University of Newcastle

Cassie Curryer
Research Centre for Generational Health and Ageing; ARC Centre for Excellence in Population Ageing Research (CEPAR), The University of Newcastle

Veerle Dam
Julius Centre, University Medical Center Utrecht, The Netherlands

Prof Deborah Davis
University of Canberra

Prof Annette Dobson
Centre for Longitudinal and Life Course Research, The University of Queensland

Dr Xenia Dolja-Gore
Research Centre for Generational Health and Ageing, The University of Newcastle

Dr Anastasia Ejova
Macquarie University

Dr Christina Ekegren
School of Public Health and Preventive Medicine, Monash University

Prof Jane Fisher
Jean Hailes Research Unit, Monash University

Dr Lisa Fitzgerald
School of Public Health, The University of Queensland

Peta Forder
School of Medicine & Public Health, The University of Newcastle

Dr Cynthia Forlini
Sydney Health Ethics, The University of Sydney

Dr Lyn Francis
Western Sydney University

Dr Paul Gardiner
Centre for Research in Geriatric Medicine, The University of Queensland

Dr Gerrie-Cor Gast
National Institute for Public Health and the Environment, The Netherlands

Dr Ellie Gresham
Health Intelligence Unit, NSW Health

Alison Griffin
School of Public Health, The University of Queensland

Dr Megan Gu
Centre for Economic Research and Evaluation, University Technology Sydney

Dr Melissa Harris
Research Centre for Generational Health and Ageing, The University of Newcastle

Prof James Hebert
Cancer Prevention and Control Program, University of South Carolina

Prof Isabel Higgins
Research Centre for Generational Health and Ageing, The University of Newcastle

Dr Briony Hill
School of Psychology, Deakin University

Dr Madeleine Hinwood
School of Medicine and Public Health, The University of Newcastle

Marlise Hofer
University of British Columbia

Dr Libby Holden
School of Psychology, The University of Queensland

Carl Holder
Centre for Longitudinal and Life Course Research, The University of Queensland

Dr Jenna Hollis
Medical Research Council Lifecourse Epidemiology Unit, University of Southampton

Dr Alexis Hure
School of Medicine and Public Health, The University of Newcastle

Dr Caroline Jackson
School of Molecular, Genetic and Population Health Sciences, The University of Edinburgh

Prof Carol Jagger
Institute of Ageing and Health, Newcastle University, United Kingdom

Dr Melissa Johnstone
Institute of Early Childhood, Macquarie University

A/Prof Mike Jones
Psychology Department, Macquarie University

Dr Mark Jones
Centre for Longitudinal and Life Course Research, The University of Queensland

Dr Enamul Kabir
The University of Queensland

Jeeva Kanesarajah
Centre for Longitudinal and Life Course Research, The University of Queensland

Nathan Kettlewell
School of Economics, University of New South Wales

Dr Asad Khan
School of Health & Rehabilitation Sciences, The University of Queensland

Dr Luke Knibbs
School of Public Health, The University of Queensland

Sonja Kubik
School of Applied Psychology, Griffith University

Dr Maarit Laaksonen
Centre for Big Data Research in Health, University of New South Wales

A/Prof Ratilal Laloo
School of Dentistry, The University of Queensland

Dr Romy Lauche
Australian Research Centre in Complementary and Integrative Medicine, University
Technology Sydney

Joanne Lewis
Faculty of Health Sciences, The University of Sydney

Dr Derrick Lopez
Centre for Health and Ageing, The University of Western Australia

Prof Deborah Loxton
Research Centre for Generational Health and Ageing, The University of Newcastle

Dr Lesley MacDonald-Wicks
Nutrition & Dietetics, The University of Newcastle

A/ Prof Lynette MacKenzie
Faculty of Health Sciences, The University of Sydney

Dr Claire Madigan
University of Oxford, UK

Dr Zachary Marcum
University of Washington, Seattle

A/Prof Mark McEvoy
Centre for Clinical Epidemiology & Biostatistics, The University of Newcastle

A/Prof Deirdre McLaughlin
Melbourne School of Population and Global Health, The University of Melbourne

A/Prof Ruth McNair
Dept of General Practice, University of Melbourne

Alemu Sufa Melka
The University of Newcastle

Dr Seema Mahrshahi
School of Public Health, The University of Sydney

Prof Michelle Miller
Flinders University

Prof Gita Mishra
Centre for Longitudinal and Life Course Research, The University of Queensland

Dr Lisa Moran
Monash Centre for Health Research and Implementation, Monash University

Dr Katrina Moss
Centre for Longitudinal and Life Course Research, The University of Queensland

Prof Andreas Obermair
School of Medicine, The University of Queensland

Prof Lynne Parkinson
Health CRN, CQ University Australia

Dr Amanda Patterson
School of Health Sciences (Nutrition), The University of Newcastle

Dr Toby Pavey
School of Exercise and Nutrition Sciences, Queensland University of Technology

Dr Geeske Peeters
Global Brain Health Institute, Trinity College, Dublin

Dr Sabrina Pit
Northern Rivers University Department of Rural Health, The University of Sydney

Regina Prigge
The University of Edinburgh, UK

Dr Jane Rich
Faculty of Health and Medicine, The University of Newcastle

Johanna Rienks
The University of Wageningen, The Netherlands

Dr Ingrid Rowlands
Centre for Longitudinal and Life Course Research, The University of Queensland

Dr Danielle Schoenaker
Cancer Council Victoria

Prof Margot Schofield
School of Public Health, La Trobe University

Christine Sefton
The University of Newcastle

Dinberu Shebeshi
The University of Newcastle

Prof David Sibbritt
Faculty of Health, University of Technology Sydney

Dr Tina Skinner
School of Human Movement Studies, The University of Queensland

Dr Michelle Smith
School of Health and Rehabilitation Sciences, The University of Queensland

Dr Elizabeth Spencer
School of Humanities & Social Sciences, The University of Newcastle

Dr Meredith Tavener
Research Centre for Generational Health and Ageing, Health and Ageing, The University of Newcastle

Prof Helena Teede
Monash Centre for Health Research and Implementation, Monash University

Dr Eleanor Pei Hua Thong
Monash Centre for Health Research and Implementation, Monash University

A/Prof Leigh Tooth
Centre for Longitudinal and Life Course Research, The University of Queensland

Dr Luciana Torquati
Centre for Research in Exercise, Physical Activity and Health, The University of Queensland

Dr Elizabeth Tracey
Hunter Medical Research Institute (HMRI), The University of Newcastle

A/Prof Jannique Van Uffelen
Department of Kinesiology, University of Leuven, Belgium

Dr Michael Waller
Centre for Longitudinal and Life Course Research, The University of Queensland

Dr Mary Welsh
Department of Education and Training, Canberra

Dr Jananie Williams
School of Finance, Australian National University

Sarah Williams
The University of Newcastle

Dr Chia Siong Wong
Centre for Longitudinal and Life Course Research, The University of Queensland

Xiaolin Xu
Centre for Longitudinal and Life Course Research, The University of Queensland

Yi Yang
The University of Melbourne

Dr Serena Yu
University Technology Sydney

Dr Isabella Zhao
Faculty of Health, Queensland University of Technology

Current Students

PhD STUDENTS

Dr Shazia Abbas

The University of Newcastle

Supervisors: Prof Julie Byles, Prof Kichu Nair and Dr Tazeen Majeed

Akilew Adane

The University of Queensland

Supervisors: Prof Gita Mishra and A/ Prof Leigh Tooth

Sifan Cao

The University of Queensland

Supervisors: Prof Gita Mishra and Prof Annette Dobson

Cassie Curryer

The University of Newcastle

Supervisors: Prof Julie Byles and Prof Mel Gray

Dr Abhijit Chowdhury

The University of Newcastle

Supervisors: Dr Milton Hasnat, A/Prof Mark McEvoy and Dr Liz Holliday

Dr Parivash Eftekhari

The University of Newcastle

Supervisors: Prof Julie Byles, Peta Forder and Dr Melissa Harris

Carole Fisher

University Technology Sydney

Supervisors: Prof David Sibbritt and Prof Jon Adams

Christine Harrington

The University of Newcastle

Supervisors: Prof Julie Byles, Dr Melissa Harris and Dr Paul Saul

Dr Nadira Kakoly

Monash Centre for Health Research and Implementation, Monash University

Supervisors: Dr Anju Joham, Dr Lisa Moran, Prof Helena Teede and A/ Prof Arul Earnest

Jeeva Kanesarajah

The University of Queensland

Supervisors: Prof Gita Mishra, A/ Prof Jenny Whitty and Dr Michael Waller

Suzy Ladanyi

University Technology Sydney

Supervisors: Prof David Sibbritt and Prof Jon Adams

Tesfaye Mengistu

The University of Queensland

Supervisors: Prof Gita Mishra, Dr Mark Jones and A/Prof Leigh Tooth

Shiva Mishra

The University of Queensland

Supervisors: Prof Gita Mishra and Dr Hsin-Fang Chung

Sophie Meredith

University Technology Sydney

Supervisors: Prof Jon Adams, Prof David Sibbritt and Dr Jane Frawley

Dr Mijanur Rahman

The University of Newcastle

Supervisor: Prof Julie Byles

Dinberu Shebeshi

The University of Newcastle

Supervisors: Prof Julie Byles, Dr Xenia Dolja-Gore and Prof Jimmy Efird

Kailash Thapaliya

The University of Newcastle

Supervisors: Prof Julie Byles and Dr Melissa Harris

Louise Wilson

The University of Queensland

Supervisors: Prof Gita Mishra, Dr Nirmala Pandeya and Prof Julie Byles

Dr Chia Siong Wong

The University of Queensland

Supervisors: Dr Mark Jones, Prof Gita Mishra and Dr Geeske Peeters

Dr Michael Wright

Health Economics Centre for Health Economics Research and Evaluation, University Technology Sydney

Supervisors: Prof Jane Hall, Prof Marion Haas and A/Prof Kees van Gool.

Befikadu Wubishet

The University of Newcastle

Supervisors: Prof Julie Byles, Dr Melissa Harris and Danielle Lang

Xiaolin Xu

The University of Queensland

Supervisors: Dr Mark Jones and Prof Gita Mishra

Lu Yang

University Technology Sydney

Supervisors: Prof Jon Adams and Prof David Sibbritt

Dongshan Zhu

The University of Queensland

Supervisors: Prof Gita Mishra, Prof Annette Dobson and Dr Hsin-Fang Chung

Project Staff

THE UNIVERSITY OF QUEENSLAND

ALSWH Director

Professor Gita Mishra

Deputy Director/Principal Research Fellow

A/ Professor Leigh Tooth

Professorial Research Fellow

Professor Annette Dobson

Research Officers/Assistants

Dr Hsiu-Wen Chan

Danielle Schoenaker

Jeeva Kanesarajah

Akilew Adane

Research Project Manager

Megan Ferguson

Statistician

Richard Hockey

Biostatistician

Dr Michael Waller

Data Manager

David Fitzgerald

Communication and Engagement Officer

Helen Gray

Data/Statistical Assistants

Ewan MacKenzie

Carl Holder

Administrative Officers

Leonie Gemmell

Christine Coleman

THE UNIVERSITY OF NEWCASTLE

ALSWH Director

Professor Julie Byles

Deputy Director

Professor Deborah Loxton

Research Fellows

Dr Melissa Harris

Dr Xenia Dolja-Gore

Statistician

Peta Forder

Operations Manager

Anna Graves

Database Developer

Ryan Tuckerman

Data Assistant

Dominic Cavenagh

Research Assistance Manager

Natalie Townsend

Administrative Officers

Melanie Moonen

Clare Thomson

Katherine Bailey

Project Assistants

Margaret Jobber

Ellen Monaghan

Jenny Helman

Sarah Kabanoff

Jemma O'Carroll

Kristee Lee Jobson

Anna Dawes

Joanne Hiles

Madeline Cordingley

Paula Bridge

Sally Rooney

2017 Major Report

Future health service use and cost: Insights from the Australian Longitudinal Study on Women's Health

Understanding how Australian women use Medicare services at different life stages can guide and improve the provision of health services. This major report adopts a life course approach to investigate changes in women's health and health service use change across life stages.

Women's survey data were linked to Medicare Benefits Scheme (MBS) data, enabling analysis of women's health, health behaviours and social circumstances over time, and how these relate to health care use at different life stages. Using these data, the report provides detailed information on how and when women use health services, and their costs, throughout the women's life course. Here we provide a summary of some of the key findings.

Use and costs of General Practice services

The annual number of GP visits increased with age, from an average of around 4-5 services per year at age 20, to around 15 services per year by age 90. The most rapid increase in GP service use occurred after the age of 55 years.

Today's young women (aged 21 in 2013) used fewer GP services but had higher out-of-pocket costs than similarly aged women from 1996.

Comparing GP use for women with different circumstances, we found:

- Women living in remote areas had the least number of GP services, and those living in major cities had the most.
- Women with difficulty managing on their income visited the GP 1-3 times more often, but had lower out-of-pocket costs. However, once other factors were taken into account these women had fewer services.
- University-educated women have the lowest number of GP services whereas those with less than Year 12 qualification have the highest.
- Women who have a health care card have more GP services each year, than women without a health care card, but lower out-of-pocket costs. These differences are likely to reflect need for health care as well as women's ability to access health care services.

In terms of need, GP service use was higher for women with more chronic conditions particularly in the 1921-26 cohort. GP use was strongly related to depression in younger women, and diabetes, hypertension, heart disease, respiratory disease and arthritis in older women. After adjusting for need and other factors, both current and ex-smokers from the 1973-78 cohort visited the GP more than non-smokers. However, in the 1946-51 cohort current smokers visited GPs less while ex-smokers visited the GP more often –consistent with quitting after developing a smoking related illness.

Body mass index (BMI) was significantly related to GP service use among women in the 1973-78 and 1989-95 cohorts, with overweight or obese women having higher service use. Other factors associated with more GP use included partner status, which worked in opposite directions for the 1946-51 cohort (with partnered women having less GP service use) and in the 1921-26 cohort (with partnered women having more GP service use).

The 12 month periods before and after the birth of the first child were associated with fewer GP services. This is probably due to maternity care being conducted by a specialist obstetrician after the initial GP consultation, which is reflected in higher specialist visits for this life event.

In the 1946-51 cohort, at each age, women who were post-menopausal had the highest mean annual number of GP services, whereas women who were within 12 months of menopause had the least. Likewise, women who had previously had a hysterectomy had more GP services, with the number of services increasing with age.

In the 1921-26 cohort, women who had a past fall requiring medical attention had the highest mean number of GP and specialist services. However, in the 12 months prior to a fall, women had fewer GP services and more specialist services compared to other women of the same age. Until the age of 80, there was little difference in the number of GP services used by women in the 1921-26 cohort who were in their last 12 months of life and those who were not. From the age of 81, the number of GP services by women in their last year of life was much higher than for other women of the same age. This difference became greater with increases in age, largely due to progressively fewer services by surviving women at oldest ages. This finding is in stark contrast to the overall findings of increasing GP service use in older age. Importantly women who were not in their last year of life had GP service use similar to women in the youngest cohorts.

Differences in Medicare benefits for GP services reflect differences in GP service use. However, out-of-pocket costs increased with age within each cohort and also increased with

time across all cohorts, particularly for Surveys 1 to 3. For women in the 1973-78 and 1946-51 cohorts, this increase in costs is disproportionate to the increase in services and the increase in benefit paid. There is a reduction in increase in costs at around the time of Survey 3 for the 1921-26 cohort (2002) and Survey 4 for the 1946-51 cohort (2004), but this deceleration in costs is not seen for the 1973-78 cohort.

Use and costs of specialist services

The number of specialist services used (excluding obstetrics) remained stable until the age of 55 and then increased with age. With obstetrics included, the number of specialist services used, the Medicare benefit paid, and out-of-pocket costs peaked at around 33 years coinciding with the median age of mothers giving birth. In the 1973-78 cohort, women with university education had a higher peak benefit costs and higher out-of-pocket costs for specialist services in their 30's compared to other women, amplifying the age difference in use of specialist services.

Area differences in mean number and costs for specialist services are apparent across all cohorts, with higher use in major cities, and lowest use in remote areas. For older women, those with university education used more specialist services than those with less education. This effect is opposite to the pattern for GP use. There was little difference in specialist use according to women's ability to manage on income. As for GP visits, specialists visits were higher among people with more conditions. After adjusting for need and other factors, current smokers were less likely to have specialist visits compared with non-smokers (1989-95, 1973-78 and 1946-51 cohorts), as were overweight and obese women (1946-51 and 1921-26 cohorts). Partnered women in the 1989-95 and 1973-78 cohorts had fewer specialist services compared to unpartnered women, but partnered women in the 1921-26 cohort had more services. Having private health insurance was associated with more specialist services in the 1973-78 and 1946-51 cohort, but was not a factor for the 1921-26 cohort. There was a higher rate of specialist services in the 12 months prior to first birth, with the number of services increasing with the age of the woman. There was little difference in the number of specialist services according to menopause status, and a small increase in specialist services in the year preceding a hysterectomy.

Women who were in their last 12 months of life had an average of around 6-10 specialist services compared to 1-3 services by women who were not in their last year. The mean number of specialist services in the last year of life did not vary much by age.

Use of pathology

The mean number of pathology claims, and the Medicare benefit paid, increased across cohorts and over time, suggesting increases may not be simply due to age. Women living in remote areas of Australia had the least number of pathology services per year, and those living in major cities had the most. This area difference in pathology service use increased with age.

In the 1973-78 cohort, pathology claims were highest in 12 months prior to the birth of the first child, and were least 12 months following the birth of the first child. In the 1946-51 cohort, pathology services were higher for post-menopausal women, compared to those who were pre-menopausal or peri-menopausal. Pathology services were consistently higher for women who were in their last 12 months of life than those women who were not in their last 12 months of life, with service use declining with age for surviving women.

Use of primary care, condition specific and allied health items

Many items designed to enhance prevention and health care for people with chronic conditions appear to be underutilised. For instance, the Better Access Scheme (BAS) which was introduced in 2006 to improve access to health services for people with mental health concerns, has not been taken up by many women with poor mental health. The highest use of these items was among the younger cohorts, and within these cohorts the use of these items increased over time. In 2009, when the 1989-95 cohort were aged 14-19 years, around 7% of the women had used BAS services. Three years later in 2012, this proportion almost doubled to 13% - however another 30% of this cohort had reported depression or anxiety and had not used BAS services. In the 1973-78 cohort in 2008, when the women were aged 30-35 years, 7% accessed BAS services. By 2015, 11% had accessed services. Across all cohorts, women living in inner regional areas accessed more mental health services than those in metropolitan, outer regional, or remote/very remote areas.

Over time, the mean mental health scores increased for women with poor mental health who used the BAS, likely reflecting the benefit of the BAS.

Use of Diabetes Annual Cycle of Care (DACC) items provide another example where women who may benefit from services are not accessing them. While diabetes is common in both the 1946-51 and 1921-26 cohorts, in 2015 only 15-22% of mid-aged and older women with self-reported diabetes had a claim for DACC items. Moreover, many women who reported having diabetes also had no claim for HbA1c testing. We also saw a low use of Asthma Annual Cycle of Care (AACC) items among women with asthma. Asthma is most prevalent in young women, however only 10% of young women with asthma used AACC or

CDM services. The use of these items among women with asthma was even lower in the older cohorts. The reason for the low uptake of ACC is not known and warrants investigation of possible causes such as systemic barriers, GP incentives and patient concerns about the program. There was better uptake of AACC and CDM items in mid-aged and older women with asthma; up to 45% of these women made an AACC or CDM claim in 2015.

The most widely used group of items were those covering Health Assessments for women in the oldest cohort. There was a steady increase in uptake of health assessments among the 1921-26 cohort from the introduction of the items in 1999 (when the women were aged around 73 to 82 years), to 2003 by when around 35% of the cohort had at least one health assessment. However, there was little uptake of assessments after 2004 when the women were aged 78-83 years. Few baseline factors distinguished between women who had assessment and those who had not.

Use of equity targeted items

Rates of bulk billing, increased with the age of the cohorts, and over time, particularly for the bulk billing incentive items. The greatest use of bulk billing was among the oldest cohort. The number of women who reached the service safety net was initially low in all cohorts, but increased over time. Increases began to reverse after around age 35 in the 1973-78 cohort, coinciding with the childbearing period, and tapered off after around age 80 in the 1921-26 cohort. Across all cohorts women with a university degree, those who had less difficulty managing on income, and those without health care cards were more likely to reach the safety net.

Research themes – 2017 outcomes

ALSWH data are available for academic research use, and since the Study began in 1995 the data have been used in over 750 collaborative research projects. During 2017, 58 academic papers were published or accepted for publication. Publications covered a wide range of the ALSWH research themes, which include:

- Chronic conditions
- Reproductive health
- Weight, nutrition and physical activity
- Health service use
- Mental health
- Abuse
- Ageing
- Methodology
- Tobacco, alcohol and other drugs
- Medications
- Caring
- Social factors in health and wellbeing
- Health in rural and remote areas
- Roles and relationships
- Intergenerational issues
- Formal and informal work patterns and work-family balance

Themes with the most publications in 2017 were chronic conditions (diabetes, musculoskeletal, cardiovascular conditions, cancer, asthma), reproductive health, weight, nutrition and physical activity, and health service use. Details of publications relevant to each theme are shown in Table 1, and a full list of publications begins on p. 39.

Table 1: Publications using ALSWH data in 2017, by ALSWH research theme

TOPIC	PUBLICATIONS
<p>CHRONIC CONDITIONS: DIABETES (5 publications)</p>	<ul style="list-style-type: none"> • Adane A, Tooth L & Mishra G. Pre-pregnancy weight change and incidence of gestational diabetes mellitus: A finding from a prospective cohort study. <i>Diabetes Research and Clinical Practice</i>, 2017; 124, 72-80. • Harris M, Oldmeadow C, Hure A, Luu J, Loxton D & Attia J. Stress increases the risk of type 2 diabetes onset in women: A 12-year longitudinal study using causal modelling. <i>PLoS ONE</i>, 2017; 12(2), 1-13. • Jones M, Tett S, Peeters GMEE, Mishra G & Dobson A. New-onset diabetes after statin exposure in elderly women: The Australian Longitudinal Study on Women’s Health. <i>Drugs and Ageing</i>, 2017; 34(3), 203-209. • Schoenaker D & Mishra G. Association between age at menarche and gestational diabetes mellitus: The Australian Longitudinal Study on Women’s Health. <i>American Journal of Epidemiology</i>, 2017; doi:10.1093/aje/kww201. • Sultana N, Earnest A, Moran LJ, Teede HJ & Joham AE. Group-based developmental BMI trajectories, polycystic ovary syndrome, and gestational diabetes: A community-based longitudinal study. <i>BMC Medicine</i>, 2017; 15(1), 195.
<p>CHRONIC CONDITIONS: MUSCULOSKELTAL (5 publications)</p>	<ul style="list-style-type: none"> • Brady S, Hussain S, Brown W, Heriter S, Wany Y, Teede H, Urquhart D & Cicuttini. Predictors of back pain in middle aged women: Data from the Australian Longitudinal Study on Women’s Health. <i>Arthritis Care and Research</i>, 2017; 69(5), 709-716. • de Luca K, Parkinson L, Haldeman S, Byles J & Blyth F. The relationship between spinal pain and comorbidity: A cross-sectional analysis of 579 community-dwelling, older, Australia women. <i>Journal of Manipulative and Physiological Therapeutics</i>; 2017, 40(7), 459-466. • deLuca K, Parkinson L, Downie A, Blyth F & Byles J. Three subgroups of pain profiles identified in 227 women with arthritis: A latent class analysis. <i>Clinical Rheumatology</i>; 2017, 36(3), 625-634. • Peeters G, Rainbird S, Lorimer M, Dobson A, Mishra G & Graves S. Improvements in physical function and pain sustained for up to 10 years after knee or hip arthroplasty

TOPIC	PUBLICATIONS
	<p>irrespective of mental health status before surgery: 9,737 middle-aged and 9,292 older women from the Australian Longitudinal Study on Women’s Health. <i>Acta Orthopaedica</i>, 2017; 8(2), 158-165.</p> <ul style="list-style-type: none"> • Peeters G, Edwards KL, Brown WJ, Barker AL, Arden N, Redmond AC, Conaghan PG, Cicuttini F & Mishra G. Potential effect modifiers of the association between physical activity patterns and joint symptoms in middle aged women. <i>Arthritis Care & Research</i>, 2017 (Accepted for publication).
<p>CHRONIC CONDITIONS: CARDIOVASCULAR CONDITIONS</p> <p>(3 publications)</p>	<ul style="list-style-type: none"> • Adane A, Mishra G & Tooth L. Adult pre-pregnancy weight change and risk of developing hypertensive disorders in pregnancy. <i>Paediatric and Perinatal Epidemiology</i>, 2017; 31(3), 167-175. • Peeters G, Tett S, Hollingworth S, Gnjjidic D, Hilmer S, Dobson A & Hubbard R. Associations of guideline recommended medications for acute coronary syndromes with fall-related hospitalizations and cardiovascular events in older women with ischemic heart disease. <i>Journals of Gerontology Series A Medical Sciences</i>, 2017; 72(2), 259-265. • Vissers L, Waller M, van der Schouw Y, Hebert J, Shivappa N, Schoenaker D & Mishra G. A pro-inflammatory diet is associated with increased risk of developing hypertension among middle-aged women. <i>Nutrition, Metabolism and Cardiovascular Diseases</i>, 2017; 27(6); 564-570.
<p>CHRONIC CONDITIONS: CANCER</p> <p>(1 publication)</p>	<ul style="list-style-type: none"> • Arriaga ME, Vajdic CM, Canfell K, MacInnis R, Hull P, Magliano DJ, Banks E, Giles GG, Cumming RG, Byles JE, Taylor AW, Shaw JE, Price K, Hirani V, Mitchell P, Adelstein B-A & Laaksonen MA. Cohort Profile: The burden of cancer attributable to modifiable risk factors – the Australian Cancer-PAF Cohort Consortium. <i>BMJ Open</i>, 2017; 7(6), e016178.
<p>CHRONIC CONDITIONS: ASTHMA</p> <p>(1 publication)</p>	<ul style="list-style-type: none"> • Htet TD, Teede HJ, de Courten B, Loxton D, Real FG, Moran LJ, et al. Asthma in reproductive-aged women with polycystic ovary syndrome and association with obesity. <i>European Respiratory Journal</i>, 2017; 49(5), 1-8.

TOPIC	PUBLICATIONS
<p>CHRONIC CONDITIONS: DEMENTIA</p> <p>(1 publication)</p>	<ul style="list-style-type: none"> Waller M, Mishra G & Dobson A. Estimating the prevalence of dementia using multiple linked administrative health records and capture–recapture methodology. <i>Emerging Themes in Epidemiology</i>, 2017; 14(1), 1-9.
<p>REPRODUCTIVE HEALTH</p> <p>(17 publications)</p>	<ul style="list-style-type: none"> Adams J, Steel A, Frawley J, Broom A & Sibbritt D. Substantial out-of-pocket expenditure on maternity care practitioner consultations and treatments during pregnancy: Estimates from a nationally-representative sample of pregnant women in Australia. <i>BMC Pregnancy and Childbirth</i>, 2017; 17(1), 114. Adane A, Mishra G & Tooth L. Adult pre-pregnancy weight change and risk of developing hypertensive disorders in pregnancy. <i>Paediatric and Perinatal Epidemiology</i>, 2017; 31(3), 167-175. Adane A, Tooth L & Mishra G. Pre-pregnancy weight change and incidence of gestational diabetes mellitus: A finding from a prospective cohort study. <i>Diabetes Research and Clinical Practice</i>, 2017; 124, 72-80. Chen L, Mishra GD, Dobson AJ, Wilson LF & Jones MA. Protective effect of hormone therapy among women with hysterectomy/oophorectomy. <i>Human Reproduction</i>, 2017; 32(4), 885-892. Htet TD, Teede HJ, de Courten B, Loxton D, Real FG, Moran LJ, et al. Asthma in reproductive-aged women with polycystic ovary syndrome and association with obesity. <i>European Respiratory Journal</i>, 2017; 49(5), 1-8. Hure A, Powers J, Chojenta C & Loxton D. Rates and predictors of caesarean section for first and second births: A prospective cohort of Australian women. <i>Maternal Child and Health Journal</i>, 2017; 21(5), 1175-1184. McKenna E, Perkins A, Hure J & Gresham E. Dietary supplement use during preconception: The Australian Longitudinal Study on Women’s Health. <i>Nutrients</i>, 2017; 9(10), E1119, DOI: 10.3390/nu9101119. Mishra GD, Pandeya N, Dobson AJ, Chung HF, et al. Early menarche, nulliparity, and the risk for premature and early natural menopause. <i>Human Reproduction</i>, 2017; 32(3), 679–686.

TOPIC	PUBLICATIONS
	<ul style="list-style-type: none"> • Moran LJ, Brown WJ, McNaughton SA, Joham AE & Teede HJ. Weight management practices associated with Polycystic Ovary Syndrome and their relationships with diet and physical activity. <i>Human Reproduction</i>, 2017; 32(3), 669-678. • Schoenaker D & Mishra G. Association between age at menarche and gestational diabetes mellitus: The Australian Longitudinal Study on Women's Health. <i>American Journal of Epidemiology</i>, 2017; doi:10.1093/aje/kww201. • Steel A, Adams J & Sibbritt D. The characteristics of women who use complementary medicine while attempting to conceive: Results from a nationally representative sample of 13,224 Australian women. <i>Women's Health Issues</i>, 2017; 27(1), 67-74. • Sultana N, Earnest A, Moran LJ, Teede HJ & Joham AE. Group-based developmental BMI trajectories, polycystic ovary syndrome, and gestational diabetes: A community-based longitudinal study. <i>BMC Medicine</i>, 2017; 15(1), 195. • William J, Chojenta C, Martin MA & Loxton D. An actuarial investigation into maternal hospital cost risk factors for public patients. <i>Annals of Actuarial Science</i>, 2017; 1-24. • Wilson L, Pandeya N, Byles J & Mishra G. Hysterectomy and incidence of depressive symptoms in midlife women: The Australian Longitudinal Study on Women's Health. <i>Epidemiology and Psychiatric Sciences</i>, 2017; 13, 1-12. • Chung HF, Pandeya N, Dobson AJ, Kuh D, Brunner EJ, Crawford SL, Avis NE, Gold EB, Mitchell ES, Woods NF, Bromberger JT, Thurston RC, Joffe H, Yoshizawa T, Anderson D & Mishra GD. The role of sleep difficulties in the vasomotor menopausal symptoms and depressed mood relationships: An international pooled analysis of eight studies in the InterLACE consortium. <i>Psychological Medicine</i>, 2017 (accepted for publication). • Fisher C, Hickman L, Adam J & Sibbritt D. Cyclic perimenstrual pain and discomfort and Australian women's associated use of Complementary and Alternative Medicine: A longitudinal study. <i>Journal of Women's Health</i>, 2017 (accepted for publication). • Mishra GD, Chung HF, Gelaw YA & Loxton D. The role of smoking in the relationship between intimate partner violence and age at natural menopause: A mediation

TOPIC	PUBLICATIONS
	<p>analysis. <i>Women's Midlife Health</i>, 2017 (accepted for publication).</p>
<p>WEIGHT, NUTRITION AND PHYSICAL ACTIVITY</p> <p>(16 publications)</p>	<ul style="list-style-type: none"> • Adane A, Tooth L & Mishra G. Pre-pregnancy weight change and incidence of gestational diabetes mellitus: A finding from a prospective cohort study. <i>Diabetes Research and Clinical Practice</i>, 2017; 124, 72-80. • Ball K, Schoenaker D & Mishra D. Does psychosocial stress explain socioeconomic inequities in 9-year weight gain among young women? <i>Obesity</i>, 2017; 25(6), 1109-1114. • Bennett CJ, Truby H, Zia Z, Cain SW & Blumfield M. Investigating the relationship between sleep and macronutrient intake in women of childbearing age. <i>European Journal of Clinical Nutrition</i>, 2017; 71(6), 712-717. • Clark BK, Kolbe-Alexandre TL, Duncan MJ & Brown W. Sitting time, physical activity and sleep by work type and pattern: The Australian Longitudinal Study on Women's Health. <i>International Journal of Environmental Research and Public Health</i>, 2017; 14(3), 290. • Htet TD, Teede HJ, de Courten B, Loxton D, Real FG, Moran LJ, et al. Asthma in reproductive-aged women with polycystic ovary syndrome and association with obesity. <i>European Respiratory Journal</i>, 2017; 49(5), 1-8. • Lauche R, Sibbritt D, Ostermann T, Fuller NR, Adams J & Cramer H. Associations between yoga/meditation use, body satisfaction, and weight management methods: Results of a national cross-sectional survey of 8009 Australian women. <i>Nutrition</i>, 2017; 34, 58-64. • McKenna E, Perkins A, Hure J & Gresham E. Dietary supplement use during preconception: The Australian Longitudinal Study on Women's Health. <i>Nutrients</i>, 2017; 9(10), E1119, DOI: 10.3390/nu9101119. • Moran LJ, Brown WJ, McNaughton SA, Joham AE & Teede HJ. Weight management practices associated with Polycystic Ovary Syndrome and their relationships with diet and physical activity. <i>Human Reproduction</i>, 2017; 32(3), 669-678. • Powers J, Loxton D, Anderson A, Dobson A, Mishra G, Hockey R & Brown W. Changes in smoking, drinking, overweight and physical inactivity in young Australian women 1996-

TOPIC	PUBLICATIONS
	<p>2013. <i>Health Promotion Journal of Australia</i>, 2017; doi:10.1071/HE16085.</p> <ul style="list-style-type: none"> • Quatela AR, Patterson AJ, McEvoy M & MacDonald-Wicks LK. Breakfast cereal consumption and obesity risk amongst the mid-age cohort of the Australian Longitudinal Study on Women’s Health. <i>Healthcare</i>, 2017; 5(3), E49 • Reeves A, McEvoy M, MacDonald-Wicks L, Barker D, Attia J, Hodge A & Patterson A. Calculation of haem iron intake and its role in the development of iron deficiency in young women from the Australian Longitudinal Study on Women’s Health. <i>Nutrients</i>, 2017; 9(5), 515. • Sultana N, Earnest A, Moran LJ, Teede HJ & Joham AE. Group-based developmental BMI trajectories, polycystic ovary syndrome, and gestational diabetes: A community-based longitudinal study. <i>BMC Medicine</i>, 2017; 15(1), 195. • Vissers L, Waller M, van der Schouw Y, Hebert J, Shivappa N, Schoenaker D & Mishra G. A pro-inflammatory diet is associated with increased risk of developing hypertension among middle-aged women. <i>Nutrition, Metabolism and Cardiovascular Diseases</i>, 2017; 27(6); 564-570. • Madigan CD, Pavey T, Daley AJ, Jolly K & Brown W. Is weight cycling associated with adverse health outcomes? A cohort study. <i>Preventive Medicine</i>, 2017. • Peeters GMEE, Gardiner PA, Dobson AJ & Brown WJ. Associations between physical activity, medical costs and hospitalisations in older Australian women: Results from the Australian. Longitudinal Study on Women’s Health. <i>Journal of Science and Medicine in Sport</i>, 2017 (accepted for publication). • Peeters G, Edwards KL, Brown WJ, Barker AL, Arden N, Redmond AC, Conaghan PG, Cicuttini F & Mishra G. Potential effect modifiers of the association between physical activity patterns and joint symptoms in middle aged women. <i>Arthritis Care & Research</i>, 2017 (accepted for publication).
<p>HEALTH SERVICE USE (15 publications)</p>	<ul style="list-style-type: none"> • Adams J, Steel A, Frawley J, Broom A & Sibbritt D. Substantial out-of-pocket expenditure on maternity care practitioner consultations and treatments during pregnancy: Estimates from a nationally-representative sample of pregnant

TOPIC	PUBLICATIONS
	<p>women in Australia. <i>BMC Pregnancy and Childbirth</i>, 2017; 17(1), 114.</p> <ul style="list-style-type: none"> • Chojenta C, Byles J & Nair B. Rehabilitation and convalescent hospital stay in New South Wales: An analysis of 3,979 women aged 75+. <i>Australian and New Zealand Journal of Public Health</i>, 2017; doi:10.1111/1753-6405.12731. • Cramer H, Sibbritt D, Park CL, Adams J & Lauche R. Is the practice of yoga or meditation associated with a healthy lifestyle? Results of a national cross-sectional survey of 28695 Australian Women. <i>Journal of Psychosomatic Research</i>, 2017; 101, 104-109. • Dolja-Gore X, Harris M, Hendig H & Byles JE. Patterns of hospitalization risk for women surviving into very old age: Findings from the Australian Longitudinal Study on Women's Health. <i>Medical Care</i>; 2017, 55(4), 352-361. • Dolja-Gore X, Tavener M, Majeed T, Nair BR & Byles JE. Uptake, prevalence and predictors of first-time use for the 75+ Health Assessment Scheme. <i>Australian Journal of Primary Health</i>, 2017; 23(5), 476-481. • Forder P, Byles J, Vo K, Curryer C & Loxton D. Cumulative incidence of admission to permanent residential aged care for Australian women – A competing risk analysis. <i>Australian and New Zealand Journal of Public Health</i>, 2017; doi: 10.1111/1753-6405.12713. • Frawley J, Sibbritt D, Steel A, Chang S & Adams J. Complementary and conventional health-care utilization among young Australian women with urinary incontinence. <i>Urology</i>, 2017; 99(1), 92-99. • Lauche R, Sibbritt D, Ostermann T, Fuller NR, Adams J & Cramer H. Associations between yoga/meditation use, body satisfaction, and weight management methods: Results of a national cross-sectional survey of 8009 Australian women. <i>Nutrition</i>, 2017; 34, 58-64. • Meredith S, Frawley J, Adams J & Sibbritt D. The utilization of health services and self-care by older women with sleeping problems: Results from a nationally representative sample of 9,110 women. <i>Journal of Aging and Health</i>, 2017; doi: 10.1177/0898264316686424.

TOPIC	PUBLICATIONS
	<ul style="list-style-type: none"> • Steel A, Adams J & Sibbritt D. The characteristics of women who use complementary medicine while attempting to conceive: Results from a nationally representative sample of 13,224 Australian women. <i>Women's Health Issues</i>, 2017; 27(1), 67-74. • Wardle J, Frawley J, Adams J, Sibbritt D, Steel A & Lauche R. Associations between complementary medicine utilization and influenza/pneumococcal vaccination: Results of a national cross-sectional survey of 9151 Australian women. <i>Preventive Medicine</i>, 2017; 105, 184-189. • William J, Chojenta C, Martin MA & Loxton D. An actuarial investigation into maternal hospital cost risk factors for public patients. <i>Annals of Actuarial Science</i>, 2017; 1-24. • Yang L, Adams J & Sibbritt D. Prevalence and factors associated with the use of acupuncture and Chinese medicine: Results of a nationally representative survey of 17,161 Australian women. <i>Acupuncture in Medicine</i>, 2017; 35(3), 189-199. • Fisher C, Hickman L, Adam J & Sibbritt D. Cyclic perimenstrual pain and discomfort and Australian women's associated use of Complementary and Alternative Medicine: A longitudinal study. <i>Journal of Women's Health</i>, 2017 (accepted for publication). • Peeters GMEE, Gardiner PA, Dobson AJ & Brown WJ. Associations between physical activity, medical costs and hospitalisations in older Australian women: Results from the Australian. Longitudinal Study on Women's Health. <i>Journal of Science and Medicine in Sport</i>, 2017 (accepted for publication).
LINKED DATA (10 publications)	<ul style="list-style-type: none"> • Chen L, Mishra GD, Dobson AJ, Wilson LF & Jones MA. Protective effect of hormone therapy among women with hysterectomy/oophorectomy. <i>Human Reproduction</i>, 2017; 32(4), 885-892. • Chojenta C, Byles J & Nair B. Rehabilitation and convalescent hospital stay in New South Wales: An analysis of 3,979 women aged 75+. <i>Australian and New Zealand Journal of Public Health</i>, 2017; doi:10.1111/1753-6405.12731.

TOPIC	PUBLICATIONS
	<ul style="list-style-type: none"> • Dolja-Gore X, Harris M, Hendig H & Byles JE. Patterns of hospitalization risk for women surviving into very old age: Findings from the Australian Longitudinal Study on Women's Health. <i>Medical Care</i>; 2017, 55(4), 352-361. • Dolja-Gore X, Tavener M, Majeed T, Nair BR & Byles JE. Uptake, prevalence and predictors of first-time use for the 75+ Health Assessment Scheme. <i>Australian Journal of Primary Health</i>, 2017; 23(5), 476-481. • Forder P, Byles J, Vo K, Curryer C & Loxton D. Cumulative incidence of admission to permanent residential aged care for Australian women – A competing risk analysis. <i>Australian and New Zealand Journal of Public Health</i>, 2017; doi: 10.1111/1753-6405.12713. • Jones M, Tett S, Peeters GMEE, Mishra G & Dobson A. New-onset diabetes after statin exposure in elderly women: The Australian Longitudinal Study on Women's Health. <i>Drugs and Ageing</i>, 2017; 34(3), 203-209. • Peeters G, Tett S, Hollingworth S, Gnjjidic D, Hilmer S, Dobson A & Hubbard R. Associations of guideline recommended medications for acute coronary syndromes with fall-related hospitalizations and cardiovascular events in older women with ischemic heart disease. <i>Journals of Gerontology Series A Medical Sciences</i>, 2017; 72(2), 259-265. • Peeters G, Rainbird S, Lorimer M, Dobson A, Mishra G & Graves S. Improvements in physical function and pain sustained for up to 10 years after knee or hip arthroplasty irrespective of mental health status before surgery: 9,737 middle-aged and 9,292 older women from the Australian Longitudinal Study on Women's Health. <i>Acta Orthopaedica</i>, 2017; 8(2), 158-165. • Waller M, Mishra G & Dobson A. Estimating the prevalence of dementia using multiple linked administrative health records and capture–recapture methodology. <i>Emerging Themes in Epidemiology</i>, 2017; 14(1), 1-9. • Peeters GMEE, Gardiner PA, Dobson AJ & Brown WJ. Associations between physical activity, medical costs and hospitalisations in older Australian women: Results from the Australian. Longitudinal Study on Women's Health. <i>Journal of Science and Medicine in Sport</i>, 2017 (accepted for publication).

TOPIC	PUBLICATIONS
<p>MENTAL HEALTH (9 publications)</p>	<ul style="list-style-type: none"> • Ball K, Schoenaker D & Mishra D. Does psychosocial stress explain socioeconomic inequities in 9-year weight gain among young women? <i>Obesity</i>, 2017; 25(6), 1109-1114. • Harris M, Oldmeadow C, Hure A, Luu J, Loxton D & Attia J. Stress increases the risk of type 2 diabetes onset in women: A 12-year longitudinal study using causal modelling. <i>PLoS ONE</i>, 2017; 12(2), 1-13. • Peeters G, Rainbird S, Lorimer M, Dobson A, Mishra G & Graves S. Improvements in physical function and pain sustained for up to 10 years after knee or hip arthroplasty irrespective of mental health status before surgery: 9,737 middle-aged and 9,292 older women from the Australian Longitudinal Study on Women’s Health. <i>Acta Orthopaedica</i>, 2017; 8(2), 158-165. • Stanford S, Jones M & Loxton D. Understanding women who self-harm: Predictors and long-term outcomes in a longitudinal community sample. <i>Australian & New Zealand Journal of Psychiatry</i>, 2017; 51, 151-160. • Szalacha L, Hughes T, McNair R & Loxton D. Mental health, sexual identity, and interpersonal violence: Findings from the Australian Longitudinal Women’s Health Study. <i>BMC Women's Health</i>, 2017; 17(94), 1-11. • Townsend N, Powers J & Loxton D. Bullying among 18 to 23-year-old women in 2013. <i>Australian and New Zealand Journal of Public Health</i>, 2017; doi: 10.1111/1753-6405.12671. • Waller M, Mishra G & Dobson A. Estimating the prevalence of dementia using multiple linked administrative health records and capture–recapture methodology. <i>Emerging Themes in Epidemiology</i>, 2017; 14(1), 1-9. • Wilson L, Pandeya N, Byles J & Mishra G. Hysterectomy and incidence of depressive symptoms in midlife women: The Australian Longitudinal Study on Women's Health. <i>Epidemiology and Psychiatric Sciences</i>, 2017; 13, 1-12 • Chung HF, Pandeya N, Dobson AJ, Kuh D, Brunner EJ, Crawford SL, Avis NE, Gold EB, Mitchell ES, Woods NF, Bromberger JT, Thurston RC, Joffe H, Yoshizawa T, Anderson D & Mishra GD. The role of sleep difficulties in the vasomotor menopausal symptoms and depressed mood relationships: An international pooled analysis of eight

TOPIC	PUBLICATIONS
	<p>studies in the InterLACE consortium. <i>Psychological Medicine</i>, 2017 (accepted for publication).</p>
<p>ABUSE (5 publications)</p>	<ul style="list-style-type: none"> • Ferreira P, Loxton D & Tooth L. Intimate personal violence and caregiving: Influences on physical and mental health in middle-aged women. <i>Maturitas</i>, 2017; 102, 34-40 • Loxton D, Dolja-Gore X, Anderson A & Townsend N. Intimate partner violence adversely impacts health over 16 years and across generations: A longitudinal cohort study. <i>PLoS One</i>, 2017; 12(6), e0178138. • Szalacha L, Hughes T, McNair R & Loxton D. Mental health, sexual identity, and interpersonal violence: Findings from the Australian Longitudinal Women’s Health Study. <i>BMC Women's Health</i>, 2017; 17(94), 1-11. • Townsend N, Powers J & Loxton D. Bullying among 18 to 23-year-old women in 2013. <i>Australian and New Zealand Journal of Public Health</i>, 2017; doi: 10.1111/1753-6405.12671. • Mishra GD, Chung HF, Gelaw YA & Loxton D. The role of smoking in the relationship between intimate partner violence and age at natural menopause: A mediation analysis. <i>Women’s Midlife Health</i>, 2017 (accepted for publication).
<p>AGEING (5 publications)</p>	<ul style="list-style-type: none"> • Dolja-Gore X, Tavener M, Majeed T, Nair BR & Byles JE. Uptake, prevalence and predictors of first-time use for the 75+ Health Assessment Scheme. <i>Australian Journal of Primary Health</i>, 2017; 23(5), 476-481. • Forder P, Byles J, Vo K, Curryer C & Loxton D. Cumulative incidence of admission to permanent residential aged care for Australian women – A competing risk analysis. <i>Australian and New Zealand Journal of Public Health</i>, 2017; doi: 10.1111/1753-6405.12713. • Leigh L, Byles J & Mishra G. Change in physical function among women as they age: Findings from the Australian Longitudinal Study on Women's Health. <i>Quality of Life Research</i>, 2017; 26(4), 981-991. • Meredith S, Frawley J, Adams J & Sibbritt D. The utilization of health services and self-care by older women with sleeping problems: Results from a nationally representative sample

TOPIC	PUBLICATIONS
	<p>of 9,110 women. <i>Journal of Aging and Health</i>, 2017; doi: 10.1177/0898264316686424.</p> <ul style="list-style-type: none"> • Beard JR, Pot AM & Peeters G. Life course approach to understanding inequalities in health in later life. Michel MP, Beattie BL, Martin FC & Walston JD, <i>Oxford Textbook of Geriatric Medicine</i>, Oxford, 2017. 1-1392 University Press. (Book chapter).
<p>METHODOLOGY (4 publications)</p>	<ul style="list-style-type: none"> • Loxton D, Tooth L, Harris M, Forder P, Dobson A, Powers J, Brown W, Byles & Mishra G. Cohort Profile: The Australian Longitudinal Study on Women’s Health (ALSWH) 1989-95 cohort. <i>International Journal of Epidemiology</i>, 2017; doi: 10.1093/ije/dyx133. • Waller M, Mishra G & Dobson A. Estimating the prevalence of dementia using multiple linked administrative health records and capture–recapture methodology. <i>Emerging Themes in Epidemiology</i>, 2017; 14(1), 1-9. • William J, Chojenta C, Martin MA & Loxton D. An actuarial investigation into maternal hospital cost risk factors for public patients. <i>Annals of Actuarial Science</i>, 2017; 1-24. • Beard JR, Pot AM & Peeters G. Life course approach to understanding inequalities in health in later life. Michel MP, Beattie BL, Martin FC & Walston JD, <i>Oxford Textbook of Geriatric Medicine</i>, Oxford, 2017. 1-1392 University Press. (Book chapter).
<p>TOBACCO, ALCOHOL AND OTHER DRUGS (2 publications)</p>	<ul style="list-style-type: none"> • Powers J, Loxton D, Anderson A, Dobson A, Mishra G, Hockey R & Brown W. Changes in smoking, drinking, overweight and physical inactivity in young Australian women 1996-2013. <i>Health Promotion Journal of Australia</i>, 2017; doi:10.1071/HE16085. • Mishra GD, Chung HF, Gelaw YA & Loxton D. The role of smoking in the relationship between intimate partner violence and age at natural menopause: A mediation analysis. <i>Women’s Midlife Health</i>, 2017 (accepted for publication).
<p>MEDICATIONS (2 publications)</p>	<ul style="list-style-type: none"> • Jones M, Tett S, Peeters GMEE, Mishra G & Dobson A. New-onset diabetes after statin exposure in elderly women: The

TOPIC	PUBLICATIONS
	<p>Australian Longitudinal Study on Women's Health. <i>Drugs and Ageing</i>, 2017; 34(3), 203-209.</p> <ul style="list-style-type: none"> • Peeters G, Tett S, Hollingworth S, Gnjjidic D, Hilmer S, Dobson A & Hubbard R. Associations of guideline recommended medications for acute coronary syndromes with fall-related hospitalizations and cardiovascular events in older women with ischemic heart disease. <i>Journals of Gerontology Series A Medical Sciences</i>, 2017; 72(2), 259-265.
<p>CARING (1 publication)</p>	<ul style="list-style-type: none"> • Ferreira P, Loxton D & Tooth L. Intimate personal violence and caregiving: Influences on physical and mental health in middle-aged women. <i>Maturitas</i>, 2017; 102, 34-40.

Publications

More than 58 papers using ALSWH data were published or accepted for publication during 2017. Ten (17.25%) of these publications also used linked administrative data.

Published papers

Adams J, Steel A, Frawley J, Broom A & Sibbritt D. **Substantial out-of-pocket expenditure on maternity care practitioner consultations and treatments during pregnancy: Estimates from a nationally-representative sample of pregnant women in Australia.** *BMC Pregnancy and Childbirth*, 2017; 17(1), 114.

Background: A wide range of health care options are utilised by pregnant women in Australia. The out-of-pocket costs of maternity care in Australia vary depending on many factors including model of care utilised, health insurance coverage, and women's decision to access health services outside of conventional maternity care provision.

Methods: Women from the 1973-78 cohort of the Australian Longitudinal Study on Women's Health (ALSWH) who identified as pregnant or as recently having given birth in 2009 were invited to complete a sub-study questionnaire investigating health service utilisation during their most recent pregnancy.

Results: 1,835 women agreed to participate in the sub-study. The majority of women (99.8%) consulted with a conventional health care practitioner during pregnancy, 49.4% consulted with a complementary and alternative medicine practitioner at least once during pregnancy and 89.6% of the women used a complementary and alternative medicine product. Women reported an average of AUD\$781.10 in out-of-pocket expenses for consultations with conventional health care practitioners, AUD\$185.40 in out-of-pocket expenses for consultations with complementary and alternative medicine practitioners and AUD\$179.60 in out-of-pocket expenses for complementary and alternative medicine

products. From the study data we estimate Australian pregnant women spend over AUD\$337 M on out-of-pocket health services.

Conclusion: While the majority of pregnant women in Australia may obtain health services via the publically-funded health care system and/or private health insurance coverage, our analysis identifies substantial out-of-pocket expenditure for health care by pregnant women - a trend in public spending for maternity care of importance to policy makers, health administrators, and health professionals.

Adane A, Mishra G & Tooth L. **Adult pre-pregnancy weight change and risk of developing hypertensive disorders in pregnancy.** *Paediatric and Perinatal Epidemiology*, 2017; 31 (3), 167-175.

Background: While the association of pre-pregnancy body mass index (BMI) and hypertensive disorders in pregnancy (HDP) is well documented, little is known about the relationship between pre-pregnancy weight change and HDP. We examined the impact of adult pre-pregnancy weight change on the development of HDP.

Methods: We included 2,914 women, surveyed about every three years since 1996, from the 1973–78 cohort of the Australian Longitudinal Study on Women's Health. Women without hypertension or HDP were followed-up between 2003 and 2012. Generalised estimating equations were used to assess the effect of baseline BMI (mean age 20 years) and pre-pregnancy weight change on the incidence of HDP.

Results: Over 9 years of follow up, 301 incident HDP cases (6.3%) were reported from 4,813 pregnancies. Overweight and obese women at the baseline survey were 1.67 (95% CI 1.3, 2.2) and 2.15 (95% CI 1.4, 3.3) times more likely to develop HDP than normal weight women, respectively. Compared with stable weight women, women with small (>1.5–2.5%) or moderate/high (>2.5%) annual weight gain had elevated risk of HDP (RR 1.67 95% CI 1.3, 2.2; RR 2.31, 95% CI 1.8, 3.0, respectively). Women who reported annual weight loss (>1.5%) between baseline and the average age of 24 years were 46% (95% CI 0.4, 0.8) less likely to develop HDP.

Conclusions: Pre-pregnancy weight gain is associated with an increased risk of HDP, whereas early adult weight loss is associated with lower risk of HDP.

Adane A, Tooth L & Mishra G. **Pre-pregnancy weight change and incidence of gestational diabetes mellitus: A finding from a prospective cohort study.** *Diabetes Research and Clinical Practice*, 2017; 124, 72-80.

Aims: In a population-based cohort study we examined the associations between early adult pre-pregnancy weight change and the risk of gestational diabetes mellitus (GDM).

Methods: The study included 3,111 women from the 1973–78 cohort of the Australian Longitudinal Study on Women’s Health. These women have been surveyed regularly since 1996. Women without diabetes and GDM were followed-up between 2003 and 2012. Generalized estimating equations were used to assess the effect of baseline (1996, mean age 20 years) and pre-pregnancy body mass index (BMI) and the pre-pregnancy weight changes on the incidence of GDM. The full models were adjusted for sociodemographic and lifestyle factors.

Results: From 2003 to 2012, 229 GDM cases (4.4%) were reported in 5,242 pregnancies. Relative to normal BMI women, obese women at baseline (RR: 1.8, 95% CI: 1.1, 2.8) and prior to pregnancy (RR: 2.7, 95% CI: 2.0, 3.6) were at greater risk of GDM. Weight gains prior to each study pregnancy were strongly associated with increased GDM risk with an adjusted RR ranging from 2.0 to 2.9. Within under/normal range of BMI, women with a moderate/high (>2.5%/year) weight gain had 2.7 (95% CI: 1.3, 5.5) times the risk of GDM compared with women with stable weight.

Conclusions: Early adult weight gain, even within normal BMI range, is an important risk factor for the development of GDM. Weight gain prevention from early adulthood to prior to pregnancy appears to be the main strategy to prevent the incidence of GDM.

Arriaga ME, Vajdic CM, Canfell K, MacInnis R, Hull P, Magliano DJ, Banks E, Giles GG, Cumming RG, Byles JE, Taylor AW, Shaw JE, Price K, Hirani V, Mitchell P, Adelstein B-A & Laaksonen MA. **Cohort Profile: The burden of cancer attributable to modifiable risk factors – the Australian Cancer-PAF Cohort Consortium.** *BMJ Open*, 2017; 7(6), e016178.

Purpose: To estimate the Australian cancer burden attributable to lifestyle-related risk factors and their combinations using a novel population attributable fraction (PAF) method that accounts for competing risk of death, risk factor interdependence and statistical uncertainty.

Participants: 365,173 adults from seven Australian cohort studies. We linked pooled harmonised individual participant cohort data with population-based cancer and death registries to estimate exposure-cancer and exposure-death associations. Current Australian exposure prevalence was estimated from representative external sources. To illustrate the utility of the new PAF method, we calculated fractions of cancers causally related to body fatness or both tobacco and alcohol consumption avoidable in the next 10 years by risk factor modifications, comparing them with fractions produced by traditional PAF methods.

Findings to date: Over 10 years of follow-up, we observed 27,483 incident cancers and 22,078 deaths. Of cancers related to body fatness ($n=9,258$), 13% (95% CI 11% to 16%) could be avoided if those currently overweight or obese had body mass index of 18.5–24.9 kg/m². Of cancers causally related to both tobacco and alcohol ($n=4,283$), current or former smoking explains 13% (11% to 16%) and consuming more than two alcoholic drinks per day explains 6% (5% to 8%). The two factors combined explain 16% (13% to 19%): 26% (21% to 30%) in men and 8% (4% to 11%) in women. Corresponding estimates using the traditional PAF method were 20%, 31% and 10%. Our PAF estimates translate to 74,000 avoidable body fatness-related cancers and 40,000 avoidable tobacco- and alcohol-related cancers in Australia over the next 10 years (2017–2026). Traditional PAF methods not accounting for competing risk of death and interdependence of risk factors may overestimate PAFs and avoidable cancers.

Future plans: We will rank the most important causal factors and their combinations for a spectrum of cancers and inform cancer control activities.

Ball K, Schoenaker D & Mishra D. **Does psychosocial stress explain socioeconomic inequities in 9-year weight gain among young women?**

Obesity, 2017; 25(6), 1109-1114.

Objectives: This study investigated the contribution of psychosocial stress to mediating inequities in weight gain by educational status in a large cohort of young Australian women over a 9-year follow-up.

Methods: This observational cohort study used survey data drawn from 4,806 women, aged 22 to 27 years at baseline (2000), participating in the Australian Longitudinal Study on Women's Health, who reported their education level (2000), perceived stress (2003), and weight (2003 and 2012). Using a causal inference framework based on counterfactuals for mediation analysis, we fitted linear or logistic regression models to examine the total effect, decomposed into natural direct and indirect effects via perceived stress, of education level

(highest qualification completed: up to year 12/trade or diploma vs. university) on weight change.

Results: Women with lower education gained more weight over 9 years (6.1 kg, standard deviation [SD] 9.5) than women with higher education (3.8 kg, SD 7.7; $P < 0.0001$) and were more likely to be very or extremely stressed. The higher weight gain associated with low education was not mediated through perceived stress (per SD increase, percent mediated: 1.0%).

Conclusions: Education-based inequities in weight gain over time were not attributable to greater psychosocial stress among women with lower education levels.

Bennett CJ, Truby H, Zia Z, Cain SW & Blumfield M. **Investigating the relationship between sleep and macronutrient intake in women of childbearing age.** *European Journal of Clinical Nutrition*, 2017; 71(6), 712-717.

Background/Objective: Reduced sleep is a strong and independent risk factor for weight gain and obesity. Maternal obesity preconception and throughout gestation can increase the risk of adverse pregnancy outcomes and impact on offspring health in later life. This study investigated the relationship between sleeping behaviour and macronutrient intake in childbearing aged women.

Subjects/Methods: Cross-sectional data from the Australian Longitudinal Study on Women's Health 1973–78 cohort, aged 31–36 years in 2009 ($n = 8,200$). Subjective sleeping behaviour was reported and macronutrient intake was measured using a validated food frequency questionnaire. Latent class analysis (LCA) was used to derive sleeping patterns. Multivariate regression analysis was used to investigate the relationships between sleep and macronutrient intake.

Results: LCA identified three sleep patterns: (LC1) average sleep (~8 h) with no adverse sleep-related symptoms ($n = 3,570$); (LC2) average sleep (~8 h) with sleeping difficulties and severe tiredness ($n = 2,109$); and (LC3) short sleep (~6 h) with sleeping difficulties and severe tiredness ($n = 915$). In fully adjusted models, LC2 was inversely associated with percentage energy as protein ($b = -0.24$; $P = 0.01$) and the protein-to-carbohydrate ratio ($b = -0.01$; $P < 0.05$). LC3 was positively associated with percentage of energy as fat ($b = 0.29$; $P = 0.01$), saturated fat ($b = 0.24$; $P = 0.001$) and monounsaturated fat ($b = 0.09$; $P = 0.04$)

Conclusions: Sleeping behaviour patterns were associated with macronutrient intake in childbearing aged women. Improved sleep patterns, together with diet and physical activity

strategies, may make it easier for women to achieve a balanced diet and optimise their weight status in preparation for pregnancy.

Brady S, Hussain S, Brown W, Heriter S, Wany Y, Teede H, Urquhart D & Cicuttini. **Predictors of back pain in middle aged women: Data from the Australian Longitudinal Study on Women's Health.** *Arthritis Care and Research*, 2017; 69(5), 709-716.

Background: Back pain causes greater disability worldwide than any other condition, with women more likely to suffer from back pain than men. Our aim was to identify modifiable risk factors for back pain in middle-aged women.

Methods: Women born between 1946 and 1951 were randomly selected from the national health insurance scheme database to participate in The Australian Longitudinal Study of Women's Health. Self-reported data on back pain in the last 12 months, weight, physical activity and other socio-demographic factors were collected in 1998, 2001, 2004, 2007, 2010 and 2013. In 1998, 12,338 women completed the survey and 10,011 (74%) completed the 2013 survey.

Results: At baseline, median (range) age was 49.5 (44.6 – 53.5) years and 54% reported back pain. In multivariate analysis, baseline weight and depression were positive predictors of back pain over each 3 year survey interval and over the following 15 years, whereas participation in vigorous physical activity was protective. The effects of weight on back pain were most marked in women with a BMI ≥ 25 .

Conclusions: Back pain is common in middle-aged women. Increased weight, weight gain and depression were independent predictors of back pain over 15 years, whereas participation in vigorous physical activity was protective. Targeting these lifestyle factors is an important area for future research on reducing the burden of back pain in middle-aged women.

Chen L, Mishra GD, Dobson AJ, Wilson LF & Jones MA. **Protective effect of hormone therapy among women with hysterectomy/oophorectomy.** *Human Reproduction*, 2017; 32(4), 885-892.

Study question: Does exposure to menopausal hormone therapy (MHT) in mid-aged women alter their risk of cardiovascular disease (CVD) mortality and all-cause mortality?

Summary answer: MHT soon after menopause is unlikely to increase the risk of CVD mortality or all-cause mortality and may have a protective effect for women with hysterectomy/oophorectomy.

What is known already: The balance of benefits and risks of MHT are currently unclear and may differ according to when treatment starts and whether women have an intact uterus.

Study design, duration and size: A total of 13,715 participants from the mid-aged population-based cohort (born 1946–1951) of the Australian Longitudinal Study on Women's Health (ALSWH) were followed from 1998 to 2013.

Participants/materials, setting, methods: The measures included cardiovascular and all-cause mortality, exposure to MHT and menopausal status (based on 3-yearly self-reports). Electronic prescriptions data on MHT were also available from mid-2002 onwards. At each follow-up survey wave, participants were classified as: an existing user of MHT, an initiator of MHT or a non-initiator of MHT.

Main result and the role of chance: After adjusting for confounding variables, existing users of MHT had a reduced risk (hazard ratio 0.63; 95% CI, 0.43–0.92) of CVD mortality compared with non-initiators. Insufficient evidence of an association was identified for initiators of MHT (0.66; 0.35–1.24). For all-cause mortality, risks were reduced for both initiators (0.69; 0.55–0.87) and existing users (0.80; 0.70–0.91). In a subgroup analysis, women with hysterectomy/oophorectomy had lower risks of CVD mortality for both initiators (0.14; 0.02–0.98) and existing users (0.55; 0.34–0.90), but no evidence of an association was found for women whose MHT commenced during or after menopause. Similarly for all-cause mortality, only the women with hysterectomy/oophorectomy had lower risks for both initiators (0.47; 0.31–0.70) and existing users (0.69; 0.58–0.82).

Limitations, reasons for caution: Limitations include the observational nature of the study, the small number of deaths, MHT use being self-reported and the classification of menopausal status also being based on self-reported information.

Wider implications of the findings: Women considering MHT soon after menopause can be reassured that the treatment is unlikely to increase their risk of CVD mortality or all-cause mortality.

Chojenta C, Byles J & Nair B. **Rehabilitation and convalescent hospital stay in New South Wales: An analysis of 3,979 women aged 75+.** *Australian and New Zealand Journal of Public Health*, 2017; doi:10.1111/1753-6405.12731.

Objectives: With a rapidly ageing population, it is imperative to examine health service costs and plan appropriately for the future. This paper determines the factors related to extended hospital stay for 'Rehabilitation' or 'Convalescence', as defined by ICD-10 coding, in acute hospital settings for older women in New South Wales, Australia.

Methods: Participants were from the 1921–26 cohort of the Australian Longitudinal Study on Women's Health. For this analysis, self-reported survey data were linked to the NSW Admitted Patient Data Collection and the National Death Index.

Results: Of the 3,979 participants, 88% had a hospitalisation in the 13-year observation period, and 37% had either a rehabilitation or convalescence admission in an acute hospital setting. In the multivariate model, living in a regional or remote area was the only variable positively associated with having a rehabilitation or convalescence hospitalisation (AOR=1.58 [1.33, 1.87]).

Conclusions: Area of residence is the determining factor for rehabilitation or convalescence hospital admissions. These long stay admissions are not necessarily inappropriate, but due to a lack of other non-acute care options.

Implications for public health: Increased availability of rehabilitation and respite care in non-acute settings will not only improve older patient care, but will also reduce the burden on acute hospitals.

Clark BK, Kolbe-Alexandre TL, Duncan MJ & Brown W. **Sitting time, physical activity and sleep by work type and pattern: The Australian Longitudinal Study on Women's Health.** *International Journal of Environmental Research and Public Health*, 2017; 14(3), 290.

Data from the Australian Longitudinal Study on Women's Health were used to examine how work was associated with time spent sleeping, sitting and in physical activity (PA), in working women. Young (31–36 years; 2009) and mid-aged (59–64 years; 2010) women reported sleep (categorised as shorter ≤ 6 h/day and longer ≥ 8 h/day) and sitting time (work, transport, television, non-work computer, and other; summed for total sitting time) on the most recent work and non-work day; and moderate and vigorous PA (categorised as meeting/not

meeting guidelines) in the previous week. Participants reported occupation (manager/professional; clerical/sales; trades/transport/labourer), work hours (part-time; full-time) and work pattern (shift/night; not shift/night). The odds of shorter sleep on work days was higher in both cohorts for women who worked shift or night hours. Longer sitting time on work days, made up primarily of sitting for work, was found for managers/professionals, clerical/sales and full-time workers. In the young cohort, clerical/sales workers and in the mid-aged cohort, full-time workers were less likely to meet PA guidelines. These results suggest multiple behaviour interventions tailored to work patterns and occupational category may be useful to improve the sleep, sitting and activity of working women.

Cramer H, Sibbritt D, Park CL, Adams J & Lauche R. **Is the practice of yoga or meditation associated with a healthy lifestyle? Results of a national cross-sectional survey of 28695 Australian Women.** *Journal of Psychosomatic Research*, 2017; 101, 104-109.

Objectives: To examine the relationship between yoga/meditation practice and health behavior in Australian women.

Methods: Women aged 19–25 years, 31–36 years, and 62–67 years from the Australian Longitudinal Study on Women's Health (ALSWH) were surveyed regarding smoking, alcohol or drug use, physical activity and dietary behavior; and whether they practiced yoga/meditation on a regular basis. Associations of health behaviors with yoga/meditation practice were analyzed using multiple logistic regression modelling.

Results: 11,344, 8,200, and 9,151 women aged 19–25 years, 31–36 years, and 62–67 years, respectively, were included of which 29.0%, 21.7%, and 20.7%, respectively, practiced yoga/meditation. Women practicing yoga/meditation were significantly more likely to report at least moderate physical activity levels (OR = 1.50–2.79), to follow a vegetarian (OR = 1.67–3.22) or vegan (OR = 2.26–3.68) diet, and to report the use of marijuana (OR = 1.28–1.89) and illicit drugs in the last 12 months (OR = 1.23–1.98).

Conclusions: Yoga/meditation practice was associated with higher physical activity levels, a higher likelihood of vegetarian or vegan diet use, and a higher likelihood of drug use. While health professionals should keep the potential vulnerability of yoga/meditation practitioners to drug use in mind, the positive associations of yoga/meditation with a variety of positive health behaviors warrant its consideration in preventive medicine and healthcare.

de Luca K, Parkinson L, Haldeman S, Byles J & Blyth F. **The relationship between spinal pain and comorbidity: A cross-sectional analysis of 579 community-dwelling, older, Australia women.** *Journal of Manipulative and Physiological Therapeutics*; 2017, 40(7), 459-466.

Objectives: The aims of this study were to (1) report the prevalence and explore the influence of spinal pain on quality of life and (2) assess the relationship between spinal pain and the type and number of comorbidities.

Methods: This cross-sectional study comprised 579 community-dwelling, older Australian women. Women had 'spinal pain' if they marked 'yes' to neck pain, upper back pain, mid-back pain, and/or lower back pain. Descriptive statistics and binary logistic regression were performed to report the prevalence and explore the relationship between spinal pain and the type and number of comorbidities.

Results: A majority of women (55.8%) who returned surveys had spinal pain. Women with spinal pain had significantly lower physical and mental quality of life scores than women without spinal pain (Medical Outcomes Study: 36 Item Short Form Survey [SF-36] physical component summary: 40.1 ± 11.1 vs 49.0 ± 9.0 , and SF-36 mental component summary: 50.0 ± 10.5 vs 53.9 ± 8.2 , respectively). Having spinal pain was significantly associated with overweight and obesity (odds ratio 1.98 [95% confidence interval 1.3-2.96] and 2.12 [1.37-3.28]), diabetes (1.93 [1.01-3.67]), pulmonary comorbidity (1.66 [1.04-2.65]), and cardiovascular comorbidity (1.57 [1.07-2.28]). More than half of the women with spinal pain reported 2 or more comorbidities, with comorbidities significantly more common among women with spinal pain than among women without spinal pain. The odds of having spinal pain increased with an increasing number of comorbidities (2 comorbidities: 2.44 [1.47-4.04], 3 comorbidities: 3.07 [1.66-5.67], 4 comorbidities: 5.05 [1.64-15.54]).

Conclusions: Spinal pain is common in community-dwelling, older Australian women and is associated with greater disability and poorer quality of life. Diabetes, cardiovascular disease, pulmonary disease, and obesity appear to have a relationship with spinal pain. There was an incremental increase in the risk of spinal pain associated with increasing comorbidity count.

deLuca K, Parkinson L, Downie A, Blyth F & Byles J. **Three subgroups of pain profiles identified in 227 women with arthritis: A latent class analysis.** *Clinical Rheumatology*; 2017, 36(3), 625-634.

The objectives were to identify subgroups of women with arthritis based upon the multi-dimensional nature of their pain experience and to compare health and socio-demographic variables between subgroups. A latent class analysis of 227 women with self-reported arthritis was used to identify clusters of women based upon the sensory, affective, and cognitive dimensions of the pain experience. Multivariate multinomial logistic regression analysis was used to determine the relationship between cluster membership and health and sociodemographic characteristics. A three-class cluster model was most parsimonious. 39.5 % of women had a unidimensional pain profile; 38.6 % of women had moderate multidimensional pain profile that included additional pain symptomatology such as sensory qualities and pain catastrophizing; and 21.9 % of women had severe multidimensional pain profile that included prominent pain symptomatology such as sensory and affective qualities of pain, pain catastrophizing, and neuropathic pain. Women with severe multidimensional pain profile have a 30.5 % higher risk of poorer quality of life and a 7.3 % higher risk of suffering depression, and women with moderate multidimensional pain profile have a 6.4 % higher risk of poorer quality of life when compared to women with unidimensional pain. This study identified three distinct subgroups of pain profiles in older women with arthritis. Women had very different experiences of pain, and cluster membership impacted significantly on health-related quality of life. These preliminary findings provide a stronger understanding of profiles of pain and may contribute to the development of tailored treatment options in arthritis.

Dolja-Gore X, Harris M, Hendig H & Byles JE. **Patterns of hospitalization risk for women surviving into very old age: Findings from the Australian Longitudinal Study on Women's Health.** *Medical Care*; 2017, 55(4), 352-361.

Background: By 2050, adults aged 80 years and over will represent around 20% of the global population. Little is known about how adults surviving into very old age use hospital services over time.

Objective: The objective of the study was to examine patterns of hospital usage over a 10-year period for women who were aged 84 to 89 in 2010 and examine factors associated with increased use.

Methods: Survey data from 1,936 women from the 1921-26 cohort of the Australian Longitudinal Study on Women's Health were matched with the state-based Admitted Patients Data Collection. Hospital use profiles were determined using repeated measures latent class analysis.

Results: Four latent class trajectories were identified. One-quarter of the sample were at low risk of hospitalization, while 20.6% demonstrated increased risk of hospitalization and a further 38.1% had moderate hospitalization risk over time. Only 16.8% of the sample was classified as having high hospitalization risk. Correlates of hospital use for very old women differed according to hospital use class and were contingent on the timing of exposure (i.e., short-term or long-term).

Conclusions: Despite the perception that older adults place a significant burden on health care systems, the majority of women demonstrated relatively low hospital use over an extended period, even in the presence of chronic health conditions. High hospitalization risk was found to be concentrated among a small minority of these long-term survivors. The findings suggest the importance of service planning and treatment regimes that take account of the diverse trajectories of hospital use into and through advanced old age.

Dojja-Gore X, Tavener M, Majeed T, Nair BR & Byles JE. **Uptake, prevalence and predictors of first-time use for the 75+ Health Assessment Scheme.**

Australian Journal of Primary Health, 2017; 23(5), 476-481.

In 1999, the Australian Federal Government introduced Medicare items for Health Assessments for people aged 75 years and older (75+ health assessments). This research examined uptake of these assessments and identified predictors of use by women from the Australian Longitudinal Study on Women's Health (ALSWH). Assessments were identified for each year from 1999 to 2013 using linked Medicare data. Time to first assessment was examined, as well as social and health factors associated with having an assessment. From 1999 to 2013, 61.8% of women had at least one assessment. Almost one-third had an assessment within 2 years of their introduction, 25% of women died before having an assessment and 13% survived but did not have an assessment. Factors associated with assessment included being widowed, private health insurance, marital status, education, having arthritis and urinary incontinence, and less difficulty managing on income. Many women never received an assessment, and many only received one. Promotion of the 75+ health assessments is necessary among older women to increase uptake.

Ferreira P, Loxton D & Tooth L. **Intimate personal violence and caregiving: Influences on physical and mental health in middle-aged women.** *Maturitas*, 2017; 102, 34-40.

Objectives: To investigate if women with a history of having experienced intimate partner violence (IPV) who undertook caregiving would experience worse mental and physical health compared to those without caregiving roles.

Study design and main outcome measures: IPV, caregiving history and data on covariates were collected between 1996 and 2010 from 8453 participants in the Australian Longitudinal Study on Women's Health aged between 45 and 65 over the course of the study. Regression analyses were used to analyse the association of IPV and caregiving (categorised as IPV + caregiving, IPV + no caregiving, no IPV + caregiving, no IPV + no caregiving), with and without adjustment for covariates, on mental and physical health-related quality of life (HRQOL), depressive symptoms and perceived stress, measured in 2010.

Results: Experiencing IPV and being a caregiver was associated with poor health outcomes on three of the four outcomes (depressive symptoms, OR 2.08, 95% CI 1.58, 2.75; stress, OR 2.11, 95% CI 1.55, 2.87; physical HRQOL β -2.39, 95% CI -3.34, -1.44; all $p \leq 0.001$, fully adjusted) compared with not experiencing IPV or caregiving. On these outcomes, IPV and caregiving combined had a stronger association than IPV or caregiving separately. For mental HRQOL, a weaker association was found (OR 1.41 95% CI 1.02, 1.95, fully adjusted, $p = 0.04$).

Conclusions: This paper provides evidence for the cumulative health impact of stressful life events, both those that are perpetrated against an individual (violence) and those undertaken with a degree of personal agency (caregiving). The findings underscore the need to understand the drivers of poor health, for clinicians to ask about life circumstances of patients experiencing poor health, and for the provision of referral pathways for complex cases.

Forder P, Byles J, Vo K, Curryer C & Loxton D. **Cumulative incidence of admission to permanent residential aged care for Australian women – A competing risk analysis.** *Australian and New Zealand Journal of Public Health*, 2017; doi: 10.1111/1753-6405.12713.

Objective: To provide a direct estimate of the risk of admission to permanent residential aged care among older women while accounting for death, according to housing type and other variables.

Methods: A competing risk analysis from 8,867 Australian women born 1921-26, using linked data from the Australian Longitudinal Study on Women's Health (ALSWH), Residential Aged Care (RAC), and the Australian National Death Index.

Results: After accounting for deaths, around 35% of women will be admitted to RAC between ages 73 and 90. The conditional cumulative incidence of admission to RAC was 26.9% if living in a house, compared to 36.0% from an apartment, 43.6% within a retirement village, and 37.1% if living in a mobile home. Each one-year increase in age was associated with a relative 17% increased risk of RAC.

Conclusion: Around one-third of women will enter RAC between age 73 and 90. Living in a house had the lowest risk of entering residential aged care over time. Implications for public health: These findings have important implications for planning for aged care services, including the role of housing in delaying admission to residential aged care, and the need for residential care by a high proportion of women towards the end of life.

Frawley J, Sibbritt D, Steel A, Chang S & Adams J. **Complementary and conventional health-care utilization among young Australian women with urinary incontinence.** *Urology*, 2017; 99(1), 92-99.

Objective: To examine the relationship between health status and health service utilization (including conventional and complementary and alternative medicine [CAM]) accessed by women experiencing urinary incontinence (UI). Although a high number of younger women report symptoms of UI, such as leaking urine, only a small proportion seek help for these symptoms.

Materials and methods: The Australian Longitudinal Study on Women's Health is a large nationally representative study that investigates the health and well-being of women. The 2

most recent surveys (2006 and 2009) of the young cohort (women aged 28-33 and 31-36 respectively) were analyzed.

Results: The presence of UI was 8.5% in 2006 (n = 859) and 23.3% in 2009 (n = 1,878), whereas the percentage of women who sought help for their UI was 18.6% (n = 160) and 2.2% (n = 182) respectively. Women with UI had poorer health compared with women without UI ($P < .005$), and women who sought help for their symptoms had poorer physical functioning than women who did not ($P < .005$). Women who sought help were greater users of conventional and CAM health services ($P < .005$), including a general practitioner, specialist, hospital doctor, physiotherapist, and naturopath.

Conclusion: UI is relatively common in younger women. However, many do not seek help. Of the women who do seek care, a large number visit CAM professionals as well as conventional medical professionals, despite a lack of research evaluating the efficacy of CAM treatment. Research is needed to explore CAM practitioner approaches to the treatment of UI and to evaluate the efficacy of these treatments.

Harris M, Oldmeadow C, Hure A, Luu J, Loxton D & Attia J. **Stress increases the risk of type 2 diabetes onset in women: A 12-year longitudinal study using causal modelling.** *PLoS ONE*, 2017; 12(2), 1-13.

Background: Type 2 diabetes is associated with significant morbidity and mortality. Modifiable risk factors have been found to contribute up to 60% of type 2 diabetes risk. However, type 2 diabetes continues to rise despite implementation of interventions based on traditional risk factors. There is a clear need to identify additional risk factors for chronic disease prevention. The aim of this study was to examine the relationship between perceived stress and type 2 diabetes onset, and partition the estimates into direct and indirect effects.

Methods and findings: Women born in 1946–1951 (n = 12,844) completed surveys for the Australian Longitudinal Study on Women's Health in 1998, 2001, 2004, 2007 and 2010. The total causal effect was estimated using logistic regression and marginal structural modelling. Controlled direct effects were estimated through conditioning in the regression model. A graded association was found between perceived stress and all mediators in the multivariate time lag analyses. A significant association was found between hypertension, as well as physical activity and body mass index, and diabetes, but not smoking or diet quality. Moderate/high stress levels were associated with a 2.3-fold increase in the odds of diabetes three years later, for the total estimated effect. Results were only slightly attenuated when

the direct and indirect effects of perceived stress on diabetes were partitioned, with the mediators only explaining 10–20% of the excess variation in diabetes.

Conclusions: Perceived stress is a strong risk factor for type 2 diabetes. The majority of the effect estimate of stress on diabetes risk is not mediated by the traditional risk factors of hypertension, physical activity, smoking, diet quality, and body mass index. This gives a new pathway for diabetes prevention trials and clinical practice.

Htet TD, Teede HJ, de Courten B, Loxton D, Rea FG, Moran LJ, & Joham AE. **Asthma in reproductive-aged women with polycystic ovary syndrome and association with obesity.** *European Respiratory Journal*, 2017; 49(5), 1-8.

Recent research suggests that women with polycystic ovary syndrome (PCOS) may have a higher prevalence of asthma. However, there are no epidemiological studies aimed primarily at exploring the relationship between PCOS and asthma, and the effect of body mass index (BMI) on this association. This study is a cross-sectional analyses of data from the Australian Longitudinal Study on Women's Health, a large, community-based, prospective study to examine the association between PCOS and asthma in women aged 28-33 years (n=478 PCOS and n=8,134 controls). The prevalence of asthma was 15.2% in women with PCOS and 10.6% in women without PCOS (p=0.004). Women with PCOS who had asthma had a trend for a higher BMI compared with women without asthma (29.9±0.9 versus 27.7±0.4 kg·m⁻²; p=0.054). Women without PCOS who had asthma had a higher BMI compared with women without asthma (26.4±0.2 versus 24.9±0.1 kg·m⁻²; p<0.001). After adjusting for age, BMI and smoking status, PCOS was associated with increased odds of asthma (odds ratio 1.34, 95% CI 1.004-1.79; p=0.047). This study showed both PCOS status and overweight/obese status were independently associated with asthma. Further prospective studies are required to explore the possible mechanisms underpinning the association.

Hure A, Powers J, Chojenta C & Loxton D. **Rates and predictors of caesarean section for first and second births: A prospective cohort of Australian women.** *Maternal Child and Health Journal*, 2017; 21(5), 1175-1184.

Objective: To determine rates of vaginal delivery, emergency caesarean section, and elective caesarean section for first and second births in Australia, and to identify maternal predictors of caesarean section.

Methods: Data were from the Australian Longitudinal Study on Women's Health. A total of 5,275 women aged 18–38 years, who had given birth to their first child between 1996 and 2012 were included; 75.0% (n = 3956) had delivered a second child. Mode of delivery for first and second singleton birth(s) was obtained from longitudinal survey data. Socio-demographic, lifestyle, anthropometric and medical history variables were tested as predictors of mode of delivery for first and second births using multinomial logistic regression.

Results: Caesarean sections accounted for 29.1% (n = 1,535) of first births, consisting of 18.2% emergency and 10.9% elective caesareans. Mode of delivery for first and second births was consistent for 85.5% of women (n = 3383) who delivered both children either vaginally or via caesarean section. Higher maternal age and body mass index, short-stature, anxiety and having private health insurance were predictive of caesarean section for first births. Vaginal birth after caesarean section was more common in women who were older, short-statured, or had been overweight or obese for both children, compared to women who had two vaginal deliveries.

Conclusions for Practice: Rates of caesarean section in Australia are high. Renewed efforts are needed to reduce the number of unnecessary caesarean births, with particular caution applied to first births. Interventions could focus on elective caesareans for women with private health insurance or a history of anxiety.

Jones M, Tett S, Peeters GME, Mishra G & Dobson A. **New-onset diabetes after statin exposure in elderly women: The Australian Longitudinal Study on Women's Health.** *Drugs and Ageing*, 2017; 34(3), 203-209.

Introduction: Extensive clinical research has consistently shown statins lower the risk of cardiovascular events and mortality. Some studies also suggest statins increase the risk of new-onset diabetes. Research to date has rarely included elderly women, hence little is known about the risk of diabetes after statin exposure in this population.

Objectives: Our objectives were to evaluate and estimate the risk of new-onset diabetes associated with statin exposure in a cohort of elderly Australian women.

Methods: We performed an analysis of a population-based longitudinal cohort study with data linkage to the national death index and to national databases of non-hospital episodes of medical care and prescription medications dispensing. Participants included 8372 Australian women born between 1921 and 1926, alive at 1 January 2003, free of diabetes,

and eligible for data linkage. Statin exposure was ascertained based on prescriptions dispensed between 1 July 2002 and 31 August 2013.

Results: Over 10 years of follow up, 49% of the cohort had filled a prescription for statins and 5% had initiated treatment for new-onset diabetes. Multivariable Cox regression showed statin exposure was associated with a higher risk of treatment for new-onset diabetes (hazard ratio 1.33; 95% confidence interval [CI] 1.04–1.70; $p = 0.024$). This equates to a number needed to harm (NNH) of 131 (95% CI 62–1079) for 5 years of exposure to statins. Risk increased with increasing dose of statin from the hazard ratio of 1.17 (95% CI 0.84–1.65) for the lowest dose to 1.51 (95% CI 1.14–1.99) for the highest dose.

Conclusion: The dose–response for statins on new onset of diabetes suggests elderly women should not be exposed to higher doses of statins. Elderly women currently taking statins should be carefully and regularly monitored for increased blood glucose to ensure early detection and appropriate management of this potential adverse effect, including consideration of de-prescribing.

Kanesarajah J, Waller M, Whitty J & Mishra G. **The relationship between SF-6D utility scores and lifestyle factors across three life-stages: Evidence from the Australian Longitudinal Study on Women’s Health.** *Quality of Life Research*, 2017; 26(6), 1507-1519.

Purpose: To investigate how SF-6D utility scores change with age between generations of women, and to quantify the relationship of SF-6D with lifestyle factors across life-stages.

Methods: Up to seven waves of self-reported, longitudinal data were drawn for the 1973-78 (young, $N=13,772$), 1946-51 (mid-age, $N=12,792$), 1921-26 (older, $N=9,972$) cohorts from the Australian Longitudinal Study on Women’s Health. Mixed effects models were employed for analysis.

Results: Young and mid-age women had similar average SF-6D scores at baseline (0.63-0.64), which remained consistent over 16 year period. However, older women had lower scores at baseline at 0.57 which steadily declined over 15 years. Across cohorts, low education attainment, greater difficulty in managing on income, obesity, physical inactivity, heavy smoking, non-drinking and increasing stress levels were associated with lower SF-6D scores. The magnitude of effect varied between cohorts. SF-6D scores were lower amongst young women with high risk drinking behaviours than low-risk drinkers. Mid-age women who were underweight, never married, or underwent surgical menopause also reported lower SF-

6D scores. Older women who lived in remote areas, who were ex-smokers, or were underweight reported lower SF-6D scores.

Conclusion: The SF-6D utility score is sensitive to differences in lifestyle factors across adult life-stages. Gradual loss of physical functioning may explain the steady decline in health for older women. Key factors associated with SF-6D include physical activity, body mass index, menopause status, smoking, alcohol use and stress. Factors associated with poorer SF-6D scores vary in type and magnitude at different life stages.

Lai JS, Hure AJ, Oldmeadow C, McEvoy M, Byles J & Attia, J. **Prospective study on the association between diet quality and depression in mid-aged women over 9 years.** *European Journal of Nutrition*, 2017; 56, 273.

Purpose: To examine the longitudinal association between diet quality and depression using prospective data from the Australian Longitudinal Study on Women's Health.

Methods: Women born in 1946–1951 (n = 7,877) were followed over 9 years starting from 2001. Dietary intake was assessed using the Dietary Questionnaire for Epidemiological Studies (version 2) in 2001 and a shortened form in 2007 and 2010. Diet quality was summarised using the Australian Recommended Food Score. Depression was measured using the 10-item Centre for Epidemiologic Depression Scale and self-reported physician diagnosis. Pooled logistic regression models including time-varying covariates were used to examine associations between diet quality tertiles and depression. Women were also categorised based on changes in diet quality during 2001–2007. Analyses were adjusted for potential confounders.

Results: The highest tertile of diet quality was associated marginally with lower odds of depression (OR 0.94; 95 % CI 0.83, 1.00; P = 0.049) although no significant linear trend was observed across tertiles (OR 1.00; 95 % CI 0.94, 1.10; P = 0.48). Women who maintained a moderate or high score over 6 years had a 6–14 % reduced odds of depression compared with women who maintained a low score (moderate vs low score—OR 0.94; 95 % CI 0.80, 0.99; P = 0.045; high vs low score—OR 0.86; 95 % CI 0.77, 0.96; P = 0.01). Similar results were observed in analyses excluding women with prior history of depression.

Conclusion: Long-term maintenance of good diet quality may be associated with reduced odds of depression. Randomised controlled trials are needed to eliminate the possibility of residual confounding.

Lauche R, Sibbritt D, Ostermann T, Fuller NR, Adams J & Cramer H.

Associations between yoga/meditation use, body satisfaction, and weight management methods: Results of a national cross-sectional survey of 8009 Australian women. *Nutrition*, 2017; 34, 58-64.

Objectives: To analyze whether yoga or meditation use is associated with body (dis)satisfaction and weight control methods in Australian women.

Methods: Women ages 34 to 39 years from the Australian Longitudinal Study on Women's Health were surveyed regarding body satisfaction, weight control behaviors, and yoga and meditation practice. Associations of body satisfaction and weight control methods with yoga/meditation practice were analyzed using chi-squared tests and multiple logistic regression modelling.

Results: Of the 8009 women, 49% were overweight or obese. Sixty-five percent of women with normal body mass index (BMI) and approximately 95% of women with overweight/obesity wanted to lose weight. At least one in four women with normal BMI was dissatisfied with body weight and shape, as were more than two in three women with overweight/obesity. The most common weight control methods included exercising (82.7%), cutting down meal sizes (76.8%), and cutting down sugars or fats (71.9%). Yoga/meditation was practiced frequently by 688 women (8.6%) and occasionally by 1176 women (14.7%). Yoga/meditation users with normal BMI were less likely dissatisfied with body weight and shape. All yoga/meditation users more likely exercised and followed a low glycemic diet or diet books; and women with obesity occasionally using yoga/meditation also more likely used fasting or smoking to lose weight.

Conclusion: Yoga/meditation users with normal BMI appear to be more satisfied with their body weight and shape than non-yoga/meditation users. While women with normal BMI or overweight tend to rely on healthy weight control methods, women with obesity occasional using yoga/meditation may more likely utilize unhealthy weight control methods.

Leigh L, Byles J & Mishra G. **Change in physical function among women as they age: Findings from the Australian Longitudinal Study on Women's Health.** *Quality of Life Research*, 2017; 26(4), 981-991.

Purpose: Decline in physical function is common in older age, with important consequences for health-related quality of life, health care utilisation, and mortality. This study aimed to identify patterns of change in physical functioning (PF) for women in later life.

Methods: PF was measured longitudinally using the ten-item subscale of the Medical Outcomes Study 36-item Short Form Health Survey, for 10,515 participants of the Australian Longitudinal Study on Women's Health, who completed at least two surveys between 1999 (aged 73-78 years) and 2011 (aged 85-90 years). Conditional and unconditional latent profile analysis was conducted separately for deceased and surviving subgroups of women to uncover latent patterns of change in PF scores over time.

Results: Four patterns of change were identified for women who were still alive in 2011 (N = 5,928), and four similar classes for deceased women (N = 4,587): (1) 'poor PF' representing women with low PF scores, (2) 'moderate PF', (3) 'high PF', and (4) 'very high PF', where scores remained very high. All patterns exhibited a decrease in PF over time. Factors which predict low PF included sedentary levels of exercise, obese and overweight BMI, difficulty managing on income, and lower education.

Conclusions: The results provided evidence for a gradual decrease in PF for all women with age; however, there was no evidence for an increased rate of decline prior to death.

Loxton D, Dolja-Gore X, Anderson A & Townsend N. **Intimate partner violence adversely impacts health over 16 years and across generations: A longitudinal cohort study.** *PLoS One*, 2017; 12(6), e0178138.

Objectives: To determine the impact of intimate partner violence on women's mental and physical health over a 16 year period and across three generations.

Participants: Participants were from the Australian Longitudinal study on Women's Health, a broadly representative national sample of women comprised of three birth cohorts 1973–78, 1946–51 and 1921–26 who were randomly selected from the Australian Medicare (i.e. national health insurer) database in 1996 to participate in the longitudinal health and wellbeing survey. Since baseline, six waves of survey data have been collected. Women from each cohort who had returned all six surveys and had a baseline measure (Survey 1) for intimate partner violence were eligible for the current study.

Main outcome measures: The main outcome of interest was women's physical and mental health, measured using the Medical Outcome Study Short-Form (SF-36). The experience of intimate partner violence was measured using the survey item 'Have you ever been in a violent relationship with a partner/spouse?' Sociodemographic information was also collected.

Results: For all cohorts, women who had lived with intimate partner violence were more likely to report poorer mental health, physical function and general health, and higher levels of bodily pain. Some generational differences existed. Younger women showed a reduction in health associated with the onset of intimate partner violence, which was not apparent for women in the older two groups. In addition, the physical health differences between women born 1921–26 who had and had not experienced intimate partner violence tapered off overtime, whereas these differences remained constant for women born 1973–78 and 1946–51.

Conclusions: Despite generational differences, intimate partner violence adversely impacted on mental and physical health over the 16 year study period and across generations.

Loxton D, Tooth L, Harris M, Forder P, Dobson A, Powers J, Brown W, Byles & Mishra G. **Cohort Profile: The Australian Longitudinal Study on Women's Health (ALSWH) 1989-95 cohort.** *International Journal of Epidemiology*, 2017; doi: 10.1093/ije/dyx133.

In 2010, the lack of contemporary health information about women in early adulthood led the Australian Government Department of Health to provide funding for the establishment of a cohort of women who would be aged 18–23 years in 2012–13. This would be the fourth cohort of the Australian Longitudinal Study on Women's Health (ALSWH). Since 1996, the Australian Government Department of Health has funded the ALSWH to obtain data on health and health service use from three cohorts of women, born in 1973–78, 1946–51 and 1921–26. The study is based at the University of Newcastle and the University of Queensland. The purpose of the ALSWH is to provide evidence for development of policy and practice in women's health and health services.

The need for an additional cohort was driven by recognition that this generation have markedly different experiences and backgrounds from those of the existing ALSWH cohorts. In particular this new cohort, born in 1989–95, has grown up with rapid technological advancement and high levels of interpersonal connectivity via mobile phones and social media, as well as high levels of information availability through the internet. In a reflection of these generational differences, the establishment of the new cohort required the use of distinctly different recruitment and survey methods from those that were used with the original cohorts.

The 1989–95 cohort was established to identify the determinants of good health, illness and health service use throughout adult life, including the demographic, economic, health behaviour, social, environmental and personal factors that influence physical and mental health. The information obtained from all ALSWH cohorts is used by the Australian Government Department of Health as evidence for policy and planning.

McKenna E, Perkins A, Hure J & Gresham E. **Dietary supplement use during preconception: The Australian Longitudinal Study on Women's Health.**

Nutrients, 2017; 9(10), E1119, DOI: 10.3390/nu9101119.

Worldwide, dietary supplement use among reproductive aged women is becoming increasingly common. The aim of this study was to investigate dietary supplement use among Australian women during preconception. Self-reported data were collected prospectively for the Australian Longitudinal Study on Women's Health (ALSWH). The sample included 485 women aged 31-36 years, with supplement data, classified as preconception when completing Survey 5 of the ALSWH in 2009. Frequency and contingency tables were calculated and Pearson's chi-square test for associations between demographic variables and supplementation status was performed. Sixty-three per cent of women were taking at least one dietary supplement during preconception. Multiple-micronutrient supplements were the most commonly reported supplement (44%). Supplements containing folic acid and iodine were reported by 51% and 37% of preconception women, respectively. Folic acid (13%), omega-3 fatty acids (11%), vitamin C (7%), B vitamins (4%), iron (3%), and calcium (3%) were the most common single nutrients supplemented during preconception. Women trying to conceive, with no previous children, and born outside Australia were more likely to take dietary supplements. In Australia, dietary supplement use during preconception is relatively high. However, supplementation of recommended nutrients, including folic acid and iodine, could be improved.

Meredith S, Frawley J, Adams J & Sibbritt D. **The utilization of health services and self-care by older women with sleeping problems: Results from a**

nationally representative sample of 9,110 women. *Journal of Aging and Health*, 2017; doi: 10.1177/0898264316686424.

Objective: This research aims to investigate the health service use—including complementary and alternative medicine (CAM)—and self-care by women aged 62 to 67 with sleeping problems.

Method: In total, 9,110 participants (99.6%) responded to questions about sleeping problems, health service utilization and self-care (e.g., herbal medicines and vitamins), demographics, and chronic illnesses.

Results: In all, 48.2% (n = 4,394) women indicated that they had a sleeping problem. Women with sleeping problems consulted a general practitioner (GP) more frequently (odds ratio [OR] = 1.72; 95% confidence interval [CI] = [1.36, 2.17]; p < .005) and were more likely to be using herbal medicines (OR = 1.24; 95% CI = [1.13, 1.36]; p < .005) than women without sleeping problems.

Discussion: Health professionals, particularly GPs, may need to actively inquire with older patients in their care with sleeping problems about the use of herbal medicines, to ensure their sleeping problems are being directly and effectively treated, particularly in light of increased risks associated with sleeping problems for this age cohort.

Mishra GD, Pandeya N, Dobson AJ, Chung HF, et al. **Early menarche, nulliparity, and the risk for premature and early natural menopause.** *Human Reproduction*, 2017; 32(3), 679–686.

Study question: Are parity and the timing of menarche associated with premature and early natural menopause? Summary answer: Early menarche (≤ 11 years) is a risk factor for both premature menopause (final menstrual period, FMP <40 years) and early menopause (FMP 40-44 years), a risk that is amplified for nulliparous women.

What is known already: Women with either premature or early menopause face an increased risk of chronic conditions in later life and of early death. Findings from some studies suggest that early menarche and nulliparity are associated with early menopause, however overall the evidence is mixed. Much of the evidence for a direct relationship is hampered by a lack of comparability across studies, failure to adjust for confounding factors, and inadequate statistical power.

Study design, size, duration: This pooled study comprises 51,450 postmenopausal women from nine observational studies in the UK, Scandinavia, Australia, and Japan that contribute to the International collaboration for a Life Course Approach to reproductive health and Chronic disease Events (InterLACE).

Participants/materials, setting, methods: Age at menarche (categorised as ≤ 11 , 12, 13, 14, and 15 or more years) and parity (categorised as no children, one child, and two or more children) were exposures of interest. Age at FMP was confirmed by at least 12 months of

cessation of menses where this was not the result of an intervention (such as surgical menopause due to bilateral oophorectomy or hysterectomy) and categorised as premature menopause (FMP before age 40), early menopause (FMP 40-44 years), 45-49 years, 50-51 years, 52-53 years, and 54 or more years. We used multivariate multinomial logistic regression models to estimate relative risk ratio (RRR) and 95% confidence intervals (95%CI) for associations between menarche, parity and age at FMP adjusting for within-study correlation.

Main results and the role of chance: The median age at FMP was 50 years (interquartile range 48 to 53 years), with 2% of the women experiencing premature menopause and 7.6% early menopause. Women with early menarche (≤ 11 years, compared with 12-13 years) were at higher risk of premature menopause (RRR 1.80, 95% CI 1.53 to 2.12) and early menopause (1.31, 1.19 to 1.44). Nulliparity was associated with increased risk of premature menopause (2.26, 1.84 to 2.77) and early menopause (1.32, 1.09 to 1.59). Women having early menarche and nulliparity were at over five fold increased risk of premature menopause (5.64, 4.04 to 7.87) and two fold increased risk of early menopause (2.16, 1.48 to 3.15) compared with women who had menarche at ≥ 12 years and two or more children.

Limitations, reasons for caution: Most of the studies (except the birth cohorts) relied on retrospectively reported age at menarche which may have led to some degree of recall bias.

Wider implications of the findings: Our findings support early monitoring of women with early menarche, especially those who have no children, for preventive health interventions aimed at mitigating the risk of adverse health outcomes associated with early menopause.

Moran LJ, Brown WJ, McNaughton SA, Joham AE & Teede HJ. **Weight management practices associated with Polycystic Ovary Syndrome and their relationships with diet and physical activity.** *Human Reproduction*, 2017; 32(3), 669-678.

Study question: Do weight management practices differ in women with and without PCOS?

Summary answer: Women in the general population with self-reported PCOS are more likely to be using healthy weight management practices and alternative non-lifestyle measures for weight management than women without PCOS.

What is known already: Lifestyle management is the first-line treatment in PCOS. However, the specific weight management practices used by women with PCOS and their effect on diet and physical activity are unclear.

Study design, size and duration: The study was a population-based observational cross-sectional study involving women in the 1973–1978 cohort (n = 7,767 total; n = 556 with PCOS, n = 7,211 without PCOS).

Participants/materials, setting, methods: Women with and without self-reported PCOS were included. Self-reported outcome measures included healthy lifestyle-related or alternative non-lifestyle-related (e.g. laxatives or smoking) weight management practices, dietary intake and physical activity.

Main results and the role of chance: Women with PCOS were more likely to be following both healthy [reducing meal or snack size (odds ratio (OR) 1.50, 95% CI 1.14, 1.96, P = 0.004) and reducing fat or sugar intake (OR 1.32, 95% CI 1.03, 1.69, P = 0.027) or following a low glycaemic index diet (OR 2.88, 95% CI 2.30, 3.59, P < 0.001)] and alternative [smoking (OR 1.60, 95% CI 1.02, 2.52, P = 0.043) or use of laxative, diet pills, fasting or diuretics (OR 1.45, 95% CI 1.07, 1.97, P = 0.017)] weight management practices than women without PCOS. In PCOS, the use of a range of healthy weight management practices was associated with increases in physical activity (P < 0.001), diet quality (P < 0.001), percentage protein intake (P < 0.001) and decreases in glycaemic index (P < 0.001), and percentages of fat (P = 0.001), saturated fat (P < 0.001) or fibre (P = 0.003). Use of alternative weight management practices was associated with decreases in diet quality.

Limitations, reasons for caution: Limitations include the use of self-reported data for PCOS, height, weight, diet, physical activity and weight management behaviours.

Wider implications of the findings: In PCOS, we should focus on improving healthy weight practices across both diet quality and quantity, and on assessing alternative weight practices and their potential adverse effect on dietary intake.

Peeters G, Tett S, Hollingworth S, Gnjjidic D, Hilmer S, Dobson A & Hubbard R. **Associations of guideline recommended medications for acute coronary syndromes with fall-related hospitalizations and cardiovascular events in older women with ischemic heart disease.** *Journals of Gerontology Series A Medical Sciences*, 2017; 72(2), 259-265.

Background: Guidelines for acute coronary syndrome recommend statins, β -blockers, angiotensin-converting-enzyme inhibitors or renin-angiotensin system blockers, and antiplatelet agents for the secondary prevention of cardiovascular events. The aim was to

examine associations between guideline recommended medications and fall-related hospitalizations and cardiovascular events in robust and frail older women.

Methods: 2002-2011 surveys from the Australian Longitudinal Study on Women's Health linked with administrative hospital, pharmaceutical and death registry data (2003–mid-2011) were used. 885 women (82.7 ± 2.7 years, range 76-90) had prior admission for ischemic heart disease and ≥ 1 claims for any of the four medication classes. 413 (46.7%) were robust and 472 (53.3%) frail. Fall-related admissions; cardiovascular event-related admissions or death; and cardiovascular death were recorded. Associations between each of the exposures and outcomes were analyzed using survival analyses with non-cardiovascular death as a competing risk.

Results: There were 192 fall-related admissions and 314 cardiovascular events including 82 deaths. Using four recommended classes (compared to using one) was associated with increased risks of fall-related admissions (hazard ratio [HR] =2.57, 95% confidence interval [CI]=1.24-5.33), but not with cardiovascular events (HR=1.41, CI=0.97-2.05) or cardiovascular death (HR=0.68, CI=0.35-1.34). Associations for fall-related admissions were stronger in frail participants (HR=5.46, CI=1.34-22.30) than robust (HR=1.37, CI=0.48-3.95).

Conclusions: In older women with ischemic heart disease, the combination of the four recommended medication classes was associated with increased risk of falls, particularly among frail women, with no statistically significant gain in cardiovascular health. The risks of falls and consequential morbidity in women over 75 needs consideration when prescribing medications after myocardial infarction.

Peeters G, Rainbird S, Lorimer M, Dobson A, Mishra G & Graves S.

Improvements in physical function and pain sustained for up to 10 years after knee or hip arthroplasty irrespective of mental health status before surgery: 9,737 middle-aged and 9,292 older women from the Australian Longitudinal Study on Women's Health. *Acta Orthopaedica*, 2017; 8(2), 158-165.

Background and purpose: There are concerns that mental health (MH) may influence outcomes of total knee arthroplasty (TKA) or total hip arthroplasty (THA). We examined effects of poor MH before surgery on long-term outcomes of osteoarthritis-related TKA or THA in women.

Patients and methods: The data were from 9,737 middle-aged participants (47–52 years) and 9,292 older participants (73–78 years) in the Australian Longitudinal Study on Women's

Health who completed surveys between 1998 and 2013. Dates of arthroplasties were obtained from the Australian Orthopaedics Association National Joint Replacement Registry. Participants without procedures were matched with participants with procedures. Trajectories of the Short-Form 36 scores for physical functioning, bodily pain, social functioning, and mental health based on mixed modeling were plotted for participants with and without surgery (stratified according to mental health, separately for TKA and THA, and for middle-aged and older participants).

Results: In middle-aged women with poor and good MH, TKA improved physical function and reduced bodily pain, with improvements sustained up to 10 years after surgery. TKA contributed to restoration of social function in women with good MH, but this was less clear in women with poor MH. In both MH groups, mental health appeared to be unaffected by TKA. Similar patterns were observed after THA, and in older women.

Interpretation: Recovery of physical and social function and reductions in pain were sustained for up to 10 years after surgery. Improvements in physical function and pain were also observed in women with poor mental health. Thus, in our view poor mental health should not be a contraindication for arthroplasty.

Powers J, Loxton D, Anderson A, Dobson A, Mishra G, Hockey R & Brown W. **Changes in smoking, drinking, overweight and physical inactivity in young Australian women 1996-2013.** *Health Promotion Journal of Australia*, 2017; doi:10.1071/HE16085.

Issue addressed: Smoking, risky drinking, overweight and obesity, and physical inactivity are health-risk factors (HRFs) that contribute significantly to morbidity worldwide. Several initiatives have been introduced over the past two decades to reduce these HRFs. This paper examines changes in the prevalence of HRFs in young women (aged 18–23 years) between 1996 and 2013, overall and within demographic groups.

Methods: Data from two cohorts of the Australian Longitudinal Study on Women's Health, born in 1973–78 (n = 14,247) and 1989–95 (n = 17,012) were weighted to provide national estimates. Prevalence ratios were used to compare HRFs in 2013 relative to 1996.

Results: In 1996, 32% were current smokers, 38% were risky drinkers, 22% were overweight or obese and 7% were physically inactive. In 2013, corresponding estimates were 19%, 35%, 33% and 6%. Between 1996 and 2013, overall smoking prevalence

decreased, but remained over 43% among least educated women. Overweight and obesity increased in all demographic groups.

Conclusions: The findings suggest that only smoking, which has been the subject of changes in taxation, legislation and regulation, declined significantly, in all except the least educated women. In contrast, the prevalence of overweight and obesity, which has largely been addressed through awareness campaigns and voluntary actions by the food industry, increased markedly in all demographic sub-groups.

So what?: The findings show that comprehensive health promotion interventions, such as those for tobacco control, are successful (but may still be ineffective among less educated women). In contrast the measures to control population weight gain among young women have been futile so far.

Quatela AR, Patterson AJ, McEvoy M & MacDonald-Wicks LK. **Breakfast cereal consumption and obesity risk amongst the mid-age cohort of the Australian Longitudinal Study on Women's Health.** *Healthcare*, 2017; 5(3), E49.

Obesity affects 27.5% of Australian women. Breakfast cereal consumption has been proposed to be protective against obesity. This study investigated the association of breakfast cereal consumption with the risk of developing obesity (Body Mass Index (BMI) \geq 30 kg/m²) over 12 years among mid-age participants in the Australian Longitudinal Study on Women's Health (ALSWH). Dietary data were obtained at Survey 3 and obesity incidence at Surveys 4 to 7. Women were excluded if: dietary data were incomplete, energy intake was <4,500 or >20,000 kJ/day, or they reported being overweight or obese at Survey 3. Logistic regressions with discrete time survival analysis investigated the association between breakfast cereal intake and incident obesity and were adjusted for: area of residency, income, smoking, physical activity, hypertension, dietary intakes and a discrete measure of time. There were 308 incident cases of obesity. Any breakfast cereal intake was not associated with incident obesity (Odds Ratio (OR): 0.92; p = 0.68). Oat-based cereal (OR: 0.71; p = 0.01), muesli (OR: 0.57; p = 0.00) and All-Bran (OR: 0.62; p = 0.01) intakes were associated with a significant reduction in obesity risk. Among this cohort, muesli on its own, or as part of oat-based cereals, and All-Bran, were associated with a reduction in obesity. This effect may be due to particular characteristics of these cereal eaters, but the relationship warrants further investigation.

Reeves A, McEvoy M, MacDonald-Wicks L, Barker D, Attia J, Hodge A & Patterson A. **Calculation of haem iron intake and its role in the development of iron deficiency in young women from the Australian Longitudinal Study on Women's Health.** *Nutrients*, 2017; 9(5), 515.

Total iron intake is not strongly associated with iron stores, but haem iron intake may be more predictive. Haem iron is not available in most nutrient databases, so experimentally determined haem contents were applied to an Australian Food Frequency Questionnaire (FFQ) to estimate haem iron intake in a representative sample of young women (25–30 years). The association between dietary haem iron intakes and incident self-reported diagnosed iron deficiency over six years of follow-up was examined. Haem iron contents for Australian red meats, fish, and poultry were applied to haem-containing foods in the Dietary Questionnaire for Epidemiological Studies V2 (DQESv2) FFQ. Haem iron intakes were calculated for 9,076 women from the Australian Longitudinal Study on Women's Health (ALSWH) using the DQESv2 dietary data from 2003. Logistic regression was used to examine the association between haem iron intake (2003) and the incidence of iron deficiency in 2006 and 2009. Multiple logistic regression showed baseline haem iron intake was a statistically significant predictor of iron deficiency in 2006 (OR: 0.91; 95% CI: 0.84–0.99; p-value: 0.020) and 2009 (OR: 0.89; 95% CI: 0.82–0.99; p-value: 0.007). Using the energy-adjusted haem intake made little difference to the associations. Higher haem iron intake is associated with reduced odds of iron deficiency developing in young adult Australian women.

Schoenaker D & Mishra G. **Association between age at menarche and gestational diabetes mellitus: The Australian Longitudinal Study on Women's Health.** *American Journal of Epidemiology*, 2017; doi:10.1093/aje/kww201.

In this study, we aimed to examine the association between age at menarche and gestational diabetes mellitus (GDM). Data were from 4,749 women participating in the Australian Longitudinal Study on Women's Health between 2000 and 2012. Age at menarche was reported at baseline in 2000 when women were aged 22–27 years. During 12 years of follow-up, information on GDM diagnosis was obtained for each live birth. Log-binomial regression analysis was used to estimate relative risks and 95% confidence intervals. Analyses adjusted for mother's highest completed educational qualification, nulliparity, polycystic ovary syndrome, physical activity, and body mass index. Mean age at menarche was 12.9 years (standard deviation, 1.4). A first diagnosis of GDM was reported by 357 women (7.5%). Compared with women with menarche at age 13 years, women who

had their first menstruation at age ≤ 11 years had a 51% higher risk of developing GDM (95% confidence interval: 1.10, 2.07) after adjustment for GDM risk factors. Our findings indicate that a young age at menarche may identify women at higher risk of GDM. Further prospective studies are needed to confirm our findings and to elucidate the role of early-life exposures in age at menarche and subsequent GDM risk.

Stanford S, Jones M & Loxton D. **Understanding women who self-harm: Predictors and long-term outcomes in a longitudinal community sample.**

Australian & New Zealand Journal of Psychiatry, 2017; 51, 151-160.

Objective: There is growing awareness of the range of psychosocial, lifestyle, and sociodemographic factors related to self-harm, however this research is often limited by using cross-sectional or convenience samples. And while we generally assume that young adults who self-harm experience poorer long-term outcomes, longitudinal research is needed. This paper builds on prior research using a large, representative, longitudinal sample.

Methods: 5765 Australian women completed 5 surveys (age 18-23 to 31-36). Six-month self-harm was measured by self-report. We had two aims: firstly to predict future self-harm, separately for women with and without prior self-harm. Secondly, to identify outcomes 3 and 6 years following self-harm.

Results: Six-month self-harm prevalence was 2.5%. Predictors among women without recent self-harm included depression, dieting behaviours, number of male sexual partners, and abuse. Among women with recent or current self-harm, predictors were number of dieting behaviours, tiredness of life, and stress. Women who self-harmed reported poorer outcomes, namely greater difficulties in relationships at 3- and 6-year follow-up.

Conclusions: Longitudinal risk factors for self-harm differed depending on prior self-harm status, and included depression, dieting behaviours, tiredness of life and stress. These factors may serve as warning signs for new or continued self-harm. This study offers new insight into long-term outcomes up to six years after self-harm, particularly with relationships.

Steel A, Adams J & Sibbritt D. **The characteristics of women who use complementary medicine while attempting to conceive: Results from a nationally representative sample of 13,224 Australian women.** *Women's Health Issues*, 2017; 27(1), 67-74.

Background: Preconception is acknowledged globally as an important part of ensuring health for the next generation and is underpinned by principles of health promotion and preventive medicine. There is a demand for more holistic, preventive health care within preconception health services. Many women are also using complementary medicine during their reproductive years.

Materials and methods: This paper presents a longitudinal analysis of women's consultations with a complementary medicine practitioner while attempting to become pregnant, and the characteristics of women who choose to consult a complementary medicine practitioner during the preconception period. The cross-sectional and longitudinal analyses conducted in this study utilise data from the 1973 through 1978 cohort of the Australian Longitudinal Study on Women's Health (n = 13,224). Multivariate logistic regression models and generalized estimating equation models, with and without time lag, were used.

Results: Women who identified as attempting to conceive were more likely to consult with an acupuncturist (adjusted odds ratio, 1.46) or a naturopath/herbalist (adjusted odds ratio, 1.30). Women who consulted with an acupuncturist were likely to be consulting with a specialist doctor (odds ratio, 3.73) and/or have previous fertility issues (odds ratio, 2.30). Women who consulted with a naturopath were more likely to report experiencing premenstrual tension (odds ratio, 2.30) but less likely to have had a previous miscarriage (odds ratio, 0.18).

Conclusions: Policymakers and other health professionals need to be aware that health professionals who are largely unregulated and structurally isolated from conventional health care may be actively contributing to women's reproductive and physical health during the preconception period.

Sultana N, Earnest A, Moran LJ, Teede HJ & Joham AE. **Group-based developmental BMI trajectories, polycystic ovary syndrome, and gestational diabetes: A community-based longitudinal study.** *BMC Medicine*, 2017; 15(1), 195.

Background: Obesity is common in young women, increasing insulin resistance (IR) and worsening pregnancy complications, including gestational diabetes (GDM). Women with polycystic ovary syndrome (PCOS) are commonly obese, which aggravates the severity of PCOS clinical expression. Relationships between these common insulin-resistant conditions, however, remain unclear.

Methods: We conducted a secondary analysis of the Australian Longitudinal Study on Women's Health (ALSWH) database, including data from 8009 women aged 18-36 years across six surveys. We used latent-curve growth modelling to identify distinct body mass index (BMI) trajectories and multinomial logistic regression to explore sociodemographic and health variables characterizing BMI group membership. Logistic regression was used to assess independent risk of GDM.

Results: A total of 662 women (8.29%, 95% CI 7.68-8.89) reported PCOS. Three distinct BMI trajectories emerged, namely low stable (LSG) (63.8%), defined as an average trajectory remaining at ~25 kg/m²; moderately rising (MRG) (28.8%), a curvilinear trajectory commencing in a healthy BMI and terminating in the overweight range; and high-rising (HRG) (7.4%), a curvilinear trajectory starting and terminating in the obese range. A high BMI in early reproductive life predicted membership in higher trajectories. The HRG BMI trajectory was independently associated with GDM (OR 2.50, 95% CI 1.80-3.48) and was a stronger correlate than PCOS (OR 1.89, 95% CI 1.41-2.54), maternal age, socioeconomic status, or parity.

Conclusion: Our results suggest heterogeneity in BMI change among Australian women of reproductive age, with and without PCOS. Reducing early adult life weight represents an ideal opportunity to intervene at an early stage of reproductive life and decreases the risk of long-term metabolic complications such as GDM.

Szalacha L, Hughes T, McNair R & Loxton D. **Mental health, sexual identity, and interpersonal violence: Findings from the Australian Longitudinal Women's Health Study.** *BMC Women's Health*, 2017; 17(94), 1-11.

Background: We examined the relationships among experiences of interpersonal violence, mental health, and sexual identity in a national sample of young adult women in Australia.

Methods: We used existing data from the third (2003) wave of young adult women (aged 25–30) in the Australian Longitudinal Study on Women's Health (ALSWH). We conducted bivariate analyses and fit multiple and logistic regression models to test experiences of six types of interpersonal violence (physical abuse, severe physical abuse, emotional abuse, sexual abuse, harassment, and being in a violent relationship), and the number of types of violence experienced, as predictors of mental health. We compared types and number of types of violence across sexual identity subgroups.

Results: Experiences of interpersonal violence varied significantly by sexual identity. Controlling for demographic characteristics, compared to exclusively heterosexual women, mainly heterosexual and bisexual women were significantly more likely to report physical, sexual, and emotional abuse. Mainly heterosexual and lesbian women were more likely to report severe physical abuse. Mainly heterosexual women were more than three times as likely to have been in a violent relationship in the past three years, and all three sexual minority subgroups were two to three times as likely to have experienced harassment. Bisexual women reported significantly higher levels of depression than any of the other sexual identity groups and scored lower on mental health than did exclusively heterosexual women. In linear regression models, interpersonal violence strongly predicted poorer mental health for lesbian and bisexual women. Notably, mental health indicators were similar for exclusively heterosexual and sexual minority women who did not report interpersonal violence. Experiencing multiple types of interpersonal violence was the strongest predictor of stress, anxiety and depression.

Conclusions: Interpersonal violence is a key contributor to mental health disparities, especially among women who identify as mainly heterosexual or bisexual. More research is needed that examines within-group differences to determine which subgroups are at greatest risk for various types of interpersonal violence. Such information is critical to the development of effective prevention and intervention

Tooth L & Mishra G. **Factors associated with educational mobility in mid-age Australian women.** *Maturitas*, 2017; 96, 51-53.

The educational mobility of mid-age women is rarely studied. We analysed the baseline socio-economic position (SEP) and health factors associated with obtaining further education in 4,117 mid-age Australian women between 1996 and 2010 (aged 45–50 at baseline, 62–67 at follow-up) from a population-based study. Women either unemployed or working part-time at baseline had higher odds of a stable low and middle education over time (ORs ranging from 1.61 to 3.86) versus educational mobility. Apart from obesity, characteristics that may signal an unhealthy lifestyle in early mid-life were not useful indicators of women's future educational mobility.

Townsend N, Powers J & Loxton D. **Bullying among 18 to 23-year-old women in 2013.** *Australian and New Zealand Journal of Public Health*, 2017; doi: 10.1111/1753-6405.12671.

Objective: To identify the prevalence of bullying among women aged 18–23 in 2013, and to describe the demographic characteristics, health and risk factors of those who experienced bullying.

Methods: Cross-sectional analysis using data from the 1989–95 cohort of the Australian Longitudinal Study on Women's Health, a nationally representative cohort (n=16,801).

Results: More than one-quarter of women (28.4%) indicated they had never been bullied, 53.4% reported experiencing bullying in the past and 18.2% indicated that they were recently bullied. Women who had experienced bullying were more likely to have lower levels of education, less likely to be studying or employed, and had more difficulty managing on their income. Women who experienced bullying were more likely to use tobacco or illicit drugs, be overweight or obese and to be sedentary. Even after adjusting for these factors, women who had experienced bullying were at risk of poor physical health, psychological distress, suicidal thoughts and self-harm.

Conclusions: This is the first nationally representative study to demonstrate the strong association between being a victim of bullying and health outcomes in a post-school-age population.

Implications for public health: The findings highlight the need for interventions for women who have already experienced bullying and are past school age.

Vissers L, Waller M, van der Schouw Y, Hebert J, Shivappa N, Schoenaker D & Mishra G. **A pro-inflammatory diet is associated with increased risk of developing hypertension among middle-aged women.** *Nutrition, Metabolism and Cardiovascular Diseases*, 2017; 27(6); 564-570.

Background and aims: A pro-inflammatory diet is thought to lead to hypertension through oxidative stress and vessel wall inflammation. We therefore investigated the association between the dietary inflammatory index (DII) and developing hypertension in a population-based cohort of middle-aged women.

Methods and results: The Australian Longitudinal Study on Women's Health included 7169 Australian women, aged 52 years (SD 1 year) at baseline in 2001, who were followed up through 4 surveys until 2013. The DII, a literature-derived dietary index that has been validated against several inflammatory markers, was calculated based on data collected via a validated food-frequency questionnaire administered at baseline. Hypertension was defined as new onset of doctor-diagnosed hypertension, ascertained through self-report between 2001 and 2013. Generalised Estimating Equation analyses were used to investigate the association between the DII and incident hypertension. The analyses were adjusted for demographic and hypertension risk factors. During 12-years follow-up we identified 1,680 incident cases of hypertension. A more pro-inflammatory diet was associated with higher risk of hypertension in dichotomised analyses with an OR fully adjusted of 1.24, 95% CI: 1.06-1.45.

Conclusion: A pro-inflammatory diet might lead to a higher risk of developing hypertension. These results need to be replicated in other studies.

Waller M, Mishra G & Dobson A. **Estimating the prevalence of dementia using multiple linked administrative health records and capture–recapture methodology.** *Emerging Themes in Epidemiology*, 2017; 14(1), 1-9.

Background: Obtaining population-level estimates of the incidence and prevalence of dementia is challenging due to under-diagnosis and under-reporting. We investigated the feasibility of using multiple linked datasets and capture–recapture techniques to estimate rates of dementia among women in Australia.

Methods: This work is based on the Australian Longitudinal Study on Women's Health. A random sample of 12,432 women born in 1921–26 was recruited in 1996. Over 16 years of follow-up records of dementia were obtained from five sources: three-yearly self-reported

surveys; clinical assessments for aged care assistance; death certificates; pharmaceutical prescriptions filled; and, in three Australian States only, hospital in-patient records.

Results: A total of 2,534 women had a record of dementia in at least one of the data sources. The aged care assessments included dementia records for 79.3% of these women, while pharmaceutical data included 34.6%, death certificates 31.0% and survey data 18.5%. In the States where hospital data were available this source included dementia records for 55.8% of the women. Using capture–recapture methods we estimated an additional 728 women with dementia had not been identified, increasing the 16 year prevalence for the cohort from 20.4 to 26.0% (95% confidence interval [CI] 25.2, 26.8%).

Conclusions: This study demonstrates that using routinely collected health data with record linkage and capture–recapture can produce plausible estimates for dementia prevalence and incidence at a population level.

Wardle J, Frawley J, Adams J, Sibbritt D, Steel A & Lauche R. **Associations between complementary medicine utilization and influenza/pneumococcal vaccination: Results of a national cross-sectional survey of 9151 Australian Women.** *Preventive Medicine*, 2017; 105, 184-189.

Influenza and pneumococcal vaccination is recommended for all adults, with older adults considered a high-risk group for targeted intervention. As such it is important for factors affecting vaccine uptake in this group to be examined. Complementary medicine (CM) use has been suggested as a possible factor associated with lower vaccination uptake. To determine if associations exist between influenza and pneumococcal vaccine uptake in older Australian women and the use of CM, data from women aged 62–67 years surveyed as part of the Australian Longitudinal Study on Women's Health (ALSWH) were analyzed in 2013 regarding their health and health care utilization. Associations between the uptake of influenza and pneumococcal vaccinations and the use of CM were analyzed in 2016 using chi-squared tests and multiple logistic regression modelling. Of the 9,151 women, 65.6% and 17.7% reported that they had influenza and pneumococcal vaccination within the past 3 years respectively. Regression analyses show that women who consulted naturopaths/herbalists (OR = 0.64) and other CM practitioners (OR = 0.64) were less likely to have vaccination (influenza only), as were women who used yoga (OR = 0.77–0.80) and herbal medicines (OR = 0.78–0.83) (influenza and pneumococcal). Conversely, women using vitamin supplements were more likely to receive either vaccination (OR = 1.17–1.24) than those not using vitamin supplements. The interface between CM use and influenza and

pneumococcal vaccination uptake in older women appears complex, multi-factorial and often highly individualized and there is a need for further research to provide a rich examination of the decision-making and motivations of stakeholders around this important public health topic.

William J, Chojenta C, Martin MA & Loxton D. **An actuarial investigation into maternal hospital cost risk factors for public patients.** *Annals of Actuarial Science*, 2017; 1-24.

We investigate an actuarial approach to identifying the factors impacting government-funded maternal hospital costs in Australia, with a focus on women who experience adverse birth outcomes. We propose a two-phase modelling methodology that adopts actuarial methods from typical insurance claim cost modelling and extends to other statistical techniques to account for the large volume of covariates available for modelling. Specifically, Classification and Regression Trees and generalised linear mixed models are employed to analyse a data set that links longitudinal survey and administrative data from a large sample of women. The results show that adverse births are a statistically significant risk factor affecting maternal hospital costs in the antenatal and delivery periods. Other significant cost risk factors in the delivery period include mode of delivery, private health insurance status, diabetes, smoking status, area of residence and onset of labour. We demonstrate the efficacy of using actuarial techniques in non-traditional areas and highlight how the results can be used to inform public policy.

Wilson L, Pandeya N, Byles J & Mishra G. **Hysterectomy and incidence of depressive symptoms in midlife women: The Australian Longitudinal Study on Women's Health.** *Epidemiology and Psychiatric Sciences*, 2017; 13, 1-12.

Aims: There is limited longitudinal research that has looked at the longer term incidence of depressive symptoms, comparing women with a hysterectomy to women without a hysterectomy. We aimed to investigate the association between hysterectomy status and the 12-year incidence of depressive symptoms in a mid-aged cohort of Australian women, and whether these relationships were modified by use of exogenous hormones.

Methods: We used generalised estimating equation models for binary outcome data to assess the associations of the incidence of depressive symptoms (measured by the 10-item Centre for Epidemiologic Studies Depression Scale) across five surveys over a 12-year period, in women with a hysterectomy with ovarian conservation, or a hysterectomy with

bilateral oophorectomy compared with women without a hysterectomy. We further stratified women with hysterectomy by their current use of menopausal hormone therapy (MHT). Women who reported prior treatment for depression were excluded from the analysis.

Results: Compared with women without a hysterectomy (n = 4,002), both women with a hysterectomy with ovarian conservation (n = 884) and women with a hysterectomy and bilateral oophorectomy (n = 450) had a higher risk of depressive symptoms (relative risk (RR) 1.20; 95% confidence interval (CI) 1.06-1.36 and RR 1.44; 95% CI 1.22-1.68, respectively). There were differences in the strength of the risk for women with a hysterectomy with ovarian conservation, compared with those without, when we stratified by current MHT use. Compared with women without a hysterectomy who did not use MHT, women with a hysterectomy with ovarian conservation who were also MHT users had a higher risk of depressive symptoms (RR 1.57; 95% CI 1.31-1.88) than women with a hysterectomy with ovarian conservation but did not use MHT (RR 1.17; 95% CI 1.02-1.35). For women with a hysterectomy and bilateral oophorectomy, MHT use did not attenuate the risk. We could not rule out, however, that the higher risk seen among MHT users may be due to confounding by indication, i.e., MHT was prescribed to treat depressive symptoms, but their depressive symptoms persisted.

Conclusions: Women with a hysterectomy (with and without bilateral oophorectomy) have a higher risk of new incidence of depressive symptoms in the longer term that was not explained by lifestyle or socio-economic factors.

Yang L, Adams J & Sibbritt D. **Prevalence and factors associated with the use of acupuncture and Chinese medicine: Results of a nationally representative survey of 17,161 Australian women.** *Acupuncture in Medicine*, 2017; 35(3), 189-199.

Background: Traditional Chinese Medicine has considerable public support in Australia and elsewhere around the world; the literature suggests Chinese medicine (CM) and acupuncture are particularly popular.

Aim: To examine factors associated with CM/acupuncture use among young/middle-aged Australian women.

Methods: This research formed part of the Australian Longitudinal Study on Women's Health (ALSWH), a population-based cohort study. Data were obtained from the 'young' (34-39 years; n=8,010) and 'middle-aged' (62-67 years; n=9,151) ALSWH cohorts, who

completed Survey 6 (in 2012) and Survey 7 (in 2013), respectively. Outcome measures included use of CM and visits to an acupuncturist in the previous 12 months. Predictive factors included demographic characteristics, and measures of health status (diagnosed chronic medical conditions) and health service utilisation. Statistical analyses included bivariate χ^2 tests, two proportions Z-tests and backward stepwise multiple logistic regression modelling.

Results: In total, 9.5% and 6.2% of women in the young and middle-aged cohorts, respectively, had consulted an acupuncturist, and 5.7% and 4.0%, respectively, had used CM. Young women with low iron levels and/or endometriosis were more likely to use CM and/or acupuncture. Middle-aged women with low iron levels and/or chronic fatigue syndrome (CFS) were more likely to use CM, while middle-aged women with arthritis and/or CFS were more likely to use acupuncture.

Conclusion: Women with chronic conditions (including arthritis, low iron, CFS and endometriosis) were associated with higher odds of CM/acupuncture use. There is a need for further research to examine the potential benefits of CM/acupuncture for these chronic illnesses.

Published Book Chapter

Beard JR, Pot AM & Peeters G. Life course approach to understanding inequalities in health in later life. *Michel MP, Beattie BL, Martin FC & Walston JD. Oxford Textbook of Geriatric Medicine Oxford 2017:1-1392 University Press*

Accepted papers

Chung HF, Pandeya N, Dobson AJ, Kuh D, Brunner EJ, Crawford SL, Avis NE, Gold EB, Mitchell ES, Woods NF, Bromberger JT, Thurston RC, Joffe H, Yoshizawa T, Anderson D & Mishra GD. **The role of sleep difficulties in the vasomotor menopausal symptoms and depressed mood relationships: An international pooled analysis of eight studies in the InterLACE consortium.**

Psychological Medicine.

Fisher C, Hickman L, Adam J & Sibbritt D. **Cyclic perimenstrual pain and discomfort and Australian women's associated use of Complementary and Alternative Medicine: A longitudinal study.**

Journal of Women's Health.

Liu H, Hall J, Xu X, Mishra G & Byles J. **Differences in food and nutrient intakes between Australian- and Asian-born women living in Australia: Results from the Australian Longitudinal Study on Women's Health.**

Public Health Nutrition.

Madigan CD, Pavey T, Daley AJ, Jolly K & Brown W. **Is weight cycling associated with adverse health outcomes? A cohort study.**

Preventive Medicine.

Mishra GD, Chung HF, Gelaw YA & Loxton D. **The role of smoking in the relationship between intimate partner violence and age at natural menopause: A mediation analysis.**

Women's Midlife Health.

Milton AH, Vashum KP, McEvoy M, Hussain S, McElduff P, Byles J & Attia J. **Prospective study of dietary zinc intake and risk of cardiovascular disease in women.**

Nutrients.

Peeters GMEE, Gardiner PA, Dobson AJ & Brown WJ. **Associations between physical activity, medical costs and hospitalisations in older Australian women: Results from the Australian. Longitudinal Study on Women's Health.**

Journal of Science and Medicine in Sport.

Peeters G, Edwards KL, Brown WJ, Barker AL, Arden N, Redmond AC, Conaghan PG, Cicuttini F & Mishra G. **Potential effect modifiers of the association between physical activity patterns and joint symptoms in middle aged women.**

Arthritis Care & Research.

Sibbritt DW, Leach M, Chang S, Sundberg T, Cramer H, Lauche R & Adams J. **Health care utilization among young Australian women with severe tiredness: Results from the Australian Longitudinal Study on Women's Health (ALSWH).**

Health Care for Women International.

Conference Presentations

In 2017, ALSWH data were used in over 55 conference presentations.

Adane A, Tooth L & Mishra D. **Pre-pregnancy weight change and incidence of gestational diabetes mellitus: A finding from a prospective cohort study.**

The 15th World Congress on Public Health (WCPH), Melbourne, Vic, 3-7 April 2017.

Adane A, Mishra G & Tooth L. **Adult pre-pregnancy weight change and risk of developing hypertensive disorders during pregnancy.**

The 10th World Congress on Developmental Origin of Health and Disease (DOHaD 2017), Rotterdam, The Netherlands, 14-18 October, 2017.

Arriaga M, Vajdic CM, Hull P, Canfell K, MacInnis R, Banks E, Giles G, Mitchell P, Cumming R et al. **Population-level relevance of lifestyle-related risk factors for pancreatic cancer in Australia.**

American Association for Cancer Research (AACR) Annual Meeting, Washington, DC, USA, 1-5 April 2017.

Arriaga M, Vajdic CM, Hull P, Canfell K, MacInnis R, Banks E, Giles G, Mitchell P, Cumming R et al. **Premenopausal and postmenopausal breast cancer burden attributable to health behaviours and hormonal factors.**

Annual Scientific Meeting of the Clinical Oncology Society of Australia (COSA), Sydney, NSW, 13–15 November 2017.

Brown WJ, Kabir E, Gomersall S, Clark B. **BMI transitions in Australian women: Amount and causes of weight change associated with progression from healthy to unhealthy BMI over 16 years.**

24th European Congress on Obesity (ECO2017), Porto, Portugal, 17-20 May 2017.

Brown WJ. **Is too much sitting killing you? (Invited keynote presentation.)**

Australian Physiotherapy Association (APA) National Conference 2017, Sydney, NSW, 19-21 October 2017.

Brown WJ. **Taking it seriously and regularly: reflections on research into physical**

activity, sedentary behaviour and health 1958-2017.

2017 ASICS Sports Medicine Australia Conference, Langkawi, Malaysia, 25-28 October, 2017.

Brown WJ. Weighty Issues. (Invited symposium).

2017 ASICS Sports Medicine Australia Conference, Langkawi, Malaysia, 25-28 October, 2017.

Brown WJ. Increasing physical activity for the prevention of obesity in populations.

2017 Obesity Control in China Conference, Beijing, China, December, 2017.

Byles J, Dolja-Gore X, Nair K, Tavener M, Chojenta C & Mishra G. Uptake and effectiveness of preventive health assessments: A study of 11,726 older Australian women.

21st IAGG World Congress of Gerontology and Geriatrics, San Francisco, United States of America, 23-27 July 2017.

Byles J. Home and care: Analysis of 12 years of data from the Australian Longitudinal Study on Women's Health.

21st IAGG World Congress of Gerontology and Geriatrics, San Francisco, United States of America, 23-27 July 2017.

Byles J. Use, access to, and impact of Medicare services for Australian women: Findings from the Australian Longitudinal Study on Women's Health.

Australian Healthcare and Hospitals Association (AHHA) Data and Innovation Collaboration Network Meeting, Brisbane, Qld, 29 August 2017.

Byles J. Housing for older Australians: Changing capacities and constrained choices.

International Ageing Urbanism Colloquium, Singapore, 26-27 October 2017.

Byles J & Tavener M. Symposium: Late life changes in housing: Choices, enablers and barriers to ageing in place. Home and care: an example of what we know – analysis of 12 years of data from the Australian Longitudinal Study on Women's Health.

Australian Association of Gerontology and Geriatrics 50th Annual Conference, Perth, WA, 7-10 November 2017.

Byles J. Women's work: A lifecourse approach to women, work and caring.

Australian Association of Gerontology and Geriatrics 50th Annual Conference, Perth, WA, 7-10 November 2017.

Carle C, Brown L, Mishra G, Grotowski M & Hure A. **A six-year follow-up of women with restrictive eating in the Australian Longitudinal Study on Women's Health (poster presentation).**

School of Health Sciences Research Day, University of Newcastle, Newcastle, NSW, 30 June 2017.

Carle C, Brown L, Mishra G, Grotowski M & Hure A. **A six-year follow-up of women with restrictive eating in the Australian Longitudinal Study on Women's Health.**

Australian Society for Medical Research Newcastle Satellite Scientific Meeting, Newcastle, NSW, 2 June 2017.

Carter V, Lucke J & Forlini C. **Are older Australian women following recommendations for healthy cognitive ageing?**

Emerging Health Policy Research Conference 2017. Menzies Centre for Health Policy, Sydney, NSW, 27 July 2017.

Chung HF. **Cigarette smoking and risk of premature and early menopause.**

Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2017, Sydney, NSW, 28-30 September 2017.

Cordier R, Chen Y-W, Clemson L & Byles J. **The impact of memory difficulties on performing activities of daily living: A latent growth model using the Australian Longitudinal Study on Women's Health data.**

Australian National Occupational Therapy, 27th National Conference & Exhibition Perth, WA, 19-21 July 2017.

Gardiner P. **Stand up to ageing: The science of sedentary behavior in delaying age-related declines in function. (Invited plenary).**

10th National Symposium and Workshop on Anti-Aging Medicine, Bali, Indonesia, 24-26 February 2017.

Gardiner P. **Sarcopenia and frailty in older women: Predictors, patterns and impacts on health service use.**

16th Annual Meeting of the International Society of Behavioral Nutrition and Physical Activity, Victoria, Canada, 8-10 June 2017.

Gardiner P. **15 year trajectories of sitting times are associated with depressive symptoms in young women.**

15th World Congress on Public Health, Melbourne, Vic, 3-7 April 2017.

Gardiner P. **The impact of physical activity and sitting time on frailty free life expectancy.**

21st IAGG World Congress of Gerontology and Geriatrics, San Francisco, United States of America, 23-27 July 2017.

Gardiner P. **Sarcopenia and frailty in older women: Predictors, patterns and impacts on health service use.**

The Global Acute Care Excellence Forum, Brisbane, Qld, 20-21 February 2017.

Gresham E. **The longitudinal association between diet and pregnancy status among Australian women of reproductive age.**

10th Asia Pacific Conference on Clinical Nutrition, Adelaide, SA, 26-29 November 2017.

Kingston A, Byles J, Anstey K & Jagger C. **Impact of obesity on active and cognitive impairment-free life expectancies in older Australians.**

21st IAGG World Congress of Gerontology and Geriatrics, San Francisco, United States of America, 23-27 July 2017.

Laaksonen M, Arriaga M, Hull P, Canfell K, MacInnis R, Banks E, Giles G, Mitchell P, Cumming R et al. **Burden of lung cancer in Australia avoidable by modifications to lifestyle-related risk factors.**

American Association for Cancer Research (AACR) Annual Meeting, Washington, DC, USA, 1-5 April 2017.

Lauche R, Sibbritt D, Park C, Mishra G, Adams J & Cramer H. **Is the use of yoga and meditation associated with a healthy lifestyle? Results of a national cross-sectional survey of 28,695 Australian women.**

World Congress Integrative Medicine & Health 2017, Berlin, Germany, 3-5 May 2017.

Lauche R. **Is the use of yoga and meditation associated with a healthy lifestyle? Results of a national cross-sectional survey of 28,695 Australian women.**

15th World Congress on Public Health, Melbourne, Vic, 3-7 April 2017.

Looman M, Schoenaker DAJM, Soedamah-Muthu SS, Feskens EJM, Geelen A & Mishra GD. **Pre-pregnancy dietary, lifestyle and reproductive risk factors of gestational diabetes in an Australian population-based cohort.**

The 10th World Congress on Developmental Origin of Health and Disease (DOHaD 2017), Rotterdam, The Netherlands, 14-18 October, 2017.

MacKenzie L & Lewis J. **Workforce participation patterns of women with breast cancer**

in Australia.

Australian National Occupational Therapy, 27th National Conference & Exhibition Perth, WA, 19-21 July 2017.

McKenna E. Dietary supplement use during preconception and pregnancy: The Australian Longitudinal Study on Women's Health.

10th Asia Pacific Conference on Clinical Nutrition, Adelaide, SA, 26-29 November 2017

Mishra G. Life course approach to women's health.

Australian Academy of Health and Medical Sciences Annual Meetings 2017, Adelaide, SA, 19 October 2017.

Mishra G. How biological milestones in a woman's life affect health and well-being?

Queensland Department of Science, Information Technology and Innovation, International Women's Day Symposium, Brisbane, Qld, 8 March 2017.

Mishra G. Panellist - Expanding women's and adolescents' health: Integrating noncommunicable diseases through a lifecourse approach.

The 61st Commission on the Status of Women, United Nations, New York, USA, 21 March 2017.

Mishra G. InterLACE: International collaboration for a life course approach to reproductive health and chronic disease events.

Nightingale Initiatives for Global Health Symposium. New York, USA, 17 March 2017.

Mishra G. Intimate partner violence, smoking, and age at natural menopause.

Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2017, Sydney, NSW, 28 - 30 September 2017.

Moran L. Weight management practices associated with polycystic ovary syndrome and their relationships with diet and physical activity.

15th World Congress on Public Health, Melbourne, Vic, 3-7 April 2017.

Nicolaou M, Vermeulen E, Elstgeest L, Knuppel A, Colpo M, Schoenaker D, Gibson-Smith D et al. A meta-analysis of the role of a priori dietary indices in depression among 7 cohorts; The MoodFOOD project.

The International Union of Nutritional Sciences (IUNS) 21st International Congress of Nutrition (ICN), Buenos Aires, Argentina, 15-20 October 2017.

Patterson A. The effects of breakfast cereal consumption on obesity risk over 12 years

among mid-aged women in the Australian Longitudinal Study on Women's Health.
International Society for Behavioural Nutrition and Physical Activity 2017 Annual Meeting, Victoria, Canada, 7-10 June 2017.

Peeters G, White A & Tooth L. **Fall risk factors in mid-age women: Results from the Australian Longitudinal Study on Women's Health.**

21st International Association of Gerontology and Geriatrics (IAGG) World Congress of Gerontology and Geriatrics, San Francisco, United States of America, 23-27 July 2017.

Peeters G, Tett S, Hollingworth S, Gnjidic D, Hilmer S, Dobson A & Hubbard R. **Anti-platelet agent use: fall risk versus cardiovascular risk in older women.**

21st International Association of Gerontology and Geriatrics (IAGG) World Congress of Gerontology and Geriatrics, San Francisco, United States of America, 23-27 July 2017.

Peng W. **Do women with herbal medicine consultation or utilization live a healthy lifestyle? Results of a national survey of Australian women.**

15th World Congress on Public Health, Melbourne, Vic, 3-7 April 2017.

Rahman M, Efird TJ, & Byles E. **Repeated time to admission and length of stay in residential aged care: A recurrent event analysis using counting process model.**

Young Statistician Conference – Modelling Our Future, Gold Coast, Qld, 26-27 September 2017.

Schoenaker DAJM & Mishra GD. **Early age at menarche as a risk factor for developing gestational diabetes: the mediating role of preconception body mass index.**

10th World Congress on Developmental Origin of Health and Disease (DOHaD 2017), Rotterdam, The Netherlands, 14-18 October 2017.

Steel A. **The role of complementary practitioners in preconception care in Australia. Results from a nationally representative study.**

15th World Congress on Public Health, Melbourne, Vic, 3-7 April 2017.

Susanto M. **Validity of the FRAIL scale in a longitudinal cohort study of middle-aged Australian Women.**

Australian and New Zealand Society for Geriatric Medicine Annual Scientific Meeting, Rotorua, New Zealand, 10-12 May 2017.

Susanto M. **Mid-life patterns of sitting time predict frailty in older women.**

The Global Acute Care Excellence Forum, Brisbane, Qld, 20-21 February 2017.

Tooth L. **Factors associated with educational mobility in mid-age Australian women.**
15th World Congress on Public Health, Melbourne, Vic, 3-7 April 2017.

Vajdic CM, Arriaga M, Hull P, Canfell K, MacInnis R, Banks E, Giles G, Mitchell P, Cumming R et al. **Burden of colorectal cancer attributable to lifestyle-related risk factors: A pooled study of seven Australian cohorts.**
American Association for Cancer Research (AACR) Annual Meeting, Washington, DC, USA, 1-5 April 2017.

William J. **Data driven public policy – an actuarial journey in maternal health.**
Actuaries Summit, Melbourne, Vic, 21-23 May 2017.

Wilson L. **Hysterectomy and incidence of depressive symptoms in middle-aged Australian women.**
Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2017, Sydney, NSW, 28 - 30 September 2017.

Wright M. **The association between continuity of care and mammography rates.**
Australian Health Economics Society Conference, Sydney, NSW, 21 September 2017.

Wright M. **Continuity of care associated with improved preventative care: evidence from an Australian cohort study.**
GP17- RACGP Annual Scientific Conference, Sydney, NSW, 26 October 2017.

Wright M. **The association between continuity of care and mammography rates.**
Health Services Research Association of Australia and New Zealand Conference, Gold Coast, Qld, 1 November 2017.

Seminars and Workshops

Brown WJ. **Physical activity in mid-age and older women: Lessons from the Australian Longitudinal Study on Women's Health.**

University of Exeter Research symposium, Exeter, UK, May 2017.

Brown WJ. **Challenges of physical activity research: Stand up, sit down, keep moving?**

University of Porto Research Forum, Porto, Portugal, May 2017.

Byles J, Forder P & Chojenta C. **Be bold for change.**

Seminar for International Women's Day, Newcastle, NSW, 9 March 2017.

Dobson A, Mishra G, Chung E, Waller M & Jones M. **The Centre for Longitudinal and Life Course Research Showcase.**

UQ School of Public Health Seminar Series. Herston, Qld, 9 May 2017.

Forlini C, Carter V & Lucke J. **Are older Australians following recommendations for healthy cognitive ageing? Evidence from the 1921-26 cohort of the Australian Longitudinal Study on Women's Health.**

2017 Lifespan Research Day. The University of Sydney, Sydney, NSW, 26 July 2017.

Forlini C, Carter V & Lucke J. **Healthy cognitive ageing in the Australian Longitudinal Study on Women's Health (1921-26 cohort).**

2017 Public Health Research Showcase. The University of Sydney, Sydney, NSW, 18 July 2017.

Gardiner P. **Stand up to ageing: The role of sitting in declines in function.**

Invited presentation, Karolinska Institute, Stockholm, Sweden, 19 October 2017.

Gardiner P. **Stand up to ageing: The role of sitting in declines in function.**

Invited presentation, Radboud University Medical Centre, Nijmegen, Netherlands, 7 October 2017.

Harris M. **Hospital use at the end of life for older women: Moving beyond cancer.**

Deeble Institute's Think Tank on preventable hospitalisations, Melbourne, Vic, 23 May 2017.

Laaksonen M. **Preventable cancers: The future burden of cancer in Australia attributable to modifiable health behaviours.**

The Australian cancer-PAF cohort consortium Policy Forum. UNSW Sydney, Sydney, NSW, 6 December 2017.

Mishra G. **Life course approach to women's health: Findings from the InterLACE consortium.**

University of Pittsburgh, Pittsburgh, USA, 23 March 2017.

Mishra G. **Mothers' and their children's health.**

Institute of Public Health, Oslo, Norway, 18 May 2017.

Mishra G. **Life course epidemiology and women's health.**

Public lecture, The University of Tokyo, Tokyo, Japan, 26 June 2017.

Mishra G. **Australian Longitudinal Study on Women's Health.**

Australian Government Department of Health, Canberra, Australia, 7 September 2017.

Mishra G. **Hysterectomy, premature and early menopause: Predictors and health consequences.**

European Andropause and Menopause Society Webinar, 24 October 2017.

Mishra G. **Life course approach to women's health: Findings from the InterLACE consortium.**

Public lecture, Gunma University, Gunma, Japan, 28 June 2017.

Mishra G. **InterLACE Data Harmonisation.**

Collaborative Health Studies Coordinating Center. University of Washington, Seattle, USA, 2 June 2017.

Mishra G, Byles J. **Australian Longitudinal Study on Women's Health – 20 years on.**

Women's Health Week, Canberra, ACT, 4-8 September 2017.

Mishra G. **Panellist: Understanding Society (including biomarkers) Relevant to Health Policy.**

Department of Social Services: Understanding Society (including biomarkers) Relevant to Health Policy, Canberra, ACT, 6 September, 2017.

Peeters G. **The Strategies for Early Prevention of Falls (STEP) consortium.**

Osteoporosis lunch time seminar series, VU University Medical Centre, Amsterdam, The

Netherlands, 13 March 2017.

Schoenaker D. **The role of BMI in explaining the relationship between preconception diet and maternal pregnancy complications: A causal mediation analysis.**

Statistics Group Meeting, The Centre for Behavioural Research in Cancer, Cancer Council Victoria, Melbourne, Vic, May 2017

Tavener M. **Data: "What you find can depend on how you look".**

Research Centre for Generational Health and Ageing Expo Day, Newcastle, NSW, 27 November 2017.

Tavener M. **Doorways to data.**

Australian Association of Gerontology Webinar, Newcastle, NSW, 4 September 2017.

Completed Student Projects

Medication use and mental health in older Australian women

PhD candidate: Maha Alsalami

Supervisors: Professor Julie Byles, Dr Milton Hasnat and A/Professor Mark McEvoy

The University of Newcastle

Background: Multiple medication use is common among older people, and there is concern that some medications can have adverse effects on older people's mental health. However, there is limited evidence of the association between medication use and mental health outcomes, in older women.

Aims: This thesis aimed to describe medications used by women in the ALSWH who were born in 1921-1926, and to examine associations between medication use and mental health scores.

Methods: ALSWH survey data linked to Pharmaceutical Benefits data for the third quarters of 2002, 2005, 2008, and 2011 were analysed to determine the number and type of medications used, and the longitudinal association with SF-36 mental health scores.

Results: Generalized Estimating Equations (GEE) models showed that the odds of poor mental health was higher with increasing numbers of medications. However, this association was not statistically significant after adjusting for physical function and bodily pain. Further analyses assessing associations between poor mental health and use of medications for the nervous system (Class N), blood (Class B), alimentary tract and metabolism (Class A), musculoskeletal system (Class M), and cardiovascular system (Class C) did not identify a statistically significant association between use of these four classes of medications and poor mental health. Sensitivity analyses which excluded women who were using psycholeptic (N05) or psychoanaleptic (N06) medications for anxiety or depression indicated that using Class A, Class M, and Class C medications were associated with a lower risk of

poor mental health. Use of Class N medications such as analgesics, antiepileptics, anti-Parkinson and other nervous system medications, was not significantly associated with poor mental health.

Conclusion and Implications: The number of different medications or the number of different therapeutic medication groups are not clearly associated with poor mental health after controlling for physical functioning or bodily pain, which themselves are strongly associated with poor mental health. Using Class A, Class M and Class C medications was associated with lower risk of having poor mental health, in older women, after excluding N05 and N06 medications. Prescribing of appropriate medications to treat underlying conditions and symptoms affecting older women can be important for their overall wellbeing, including their mental-health related quality of life. However, the potential that some specific drugs may adversely affect mental health in some individuals remains. Mental health of older adults should be assessed alongside their physical health and wellbeing, and mental health should be considered as an outcome in medication trials.

Alcohol use in pregnancy: Mixed methods applied to the Australian Longitudinal Study on Women's Health

PhD candidate: Amy Anderson

Supervisors: Professor Deborah Loxton, Dr Frances Kay-Lambkin and Dr Alexis Hure

The University of Newcastle

Population health guidelines aim to reduce the burden of disease by providing evidence-based recommendations that can inform health behaviours. Such guidelines are used internationally, as well as in Australia, to assist in preventing the burden associated with alcohol use during pregnancy. Consuming alcohol during pregnancy at high levels may lead to severe outcomes such as Foetal Alcohol Spectrum Disorder, stillbirth, miscarriage and growth restriction. The impact of low level alcohol use during pregnancy is unclear and complex, leading to an inability to define a specific threshold at which harm occurs. The lack of clarity has led to inconsistent alcohol guidelines for pregnant women, particularly in Australia. The Australian alcohol guidelines in 1992 initially recommended abstinence, before revising the recommendation in 2001 to condone low intake, and then reverting back to abstinence in 2009. At the time of commencing this thesis, no study had assessed the population-based prevalence and predictors of alcohol use during pregnancy in respect to the change of guidelines in 2009.

This thesis used a mixed methods approach applied to the Australian Longitudinal Study on Women's Health, a prospective cohort, to investigate predictors of alcohol use during pregnancy, within the context of the changing Australian alcohol guidelines. The two specific thesis aims were to identify: (i) the prevalence of alcohol use during pregnancy since the introduction of the 2009 alcohol guidelines; and (ii) the factors contributing to alcohol use among pregnant women within Australia.

The results suggest that more than 70% of women consume alcohol during pregnancy, even with the message of abstinence; although such a message did correspond with a lower prevalence compared to the prevalence under the low intake guidelines. The most consistent indicator of alcohol use during pregnancy was pre-pregnancy alcohol patterns, particularly weekly and binge drinking. These behaviours were often continued into pregnancy, putting both the woman and foetus at an increased risk of potential adverse outcomes. Qualitative interviews with women who were pregnant after 2009 suggest that the message of "not drinking is the safest option" has not filtered down in a clear and consistent

manner. Such communication was desired by the women, particularly via healthcare professionals, to enable them to make informed choices about alcohol use during pregnancy.

These findings taken together suggest that the change of population alcohol guidelines to an abstinence message for pregnant women requires systematic dissemination via policy and practice to ensure that women are provided with information and support to reduce and abstain from alcohol use during pregnancy.

'Taking time to listen'; A longitudinal thematic analysis of women in the Australian Longitudinal Study on Women's Health 1921-1926 cohort, who were widowed at baseline survey in 1996.

PhD candidate: Robyn Kennaugh

Supervisors: Professor Julie Byles and Dr Meredith Tavener

The University of Newcastle

This thesis focused on the experience of older Australian women, and how they managed the challenges of ageing. The intent of the thesis was to understand the main issues that were reported to be important to older women, how they coped as they aged and how they adjusted following changes to their marital status. In addition, the thesis aimed to identify evidence of a Sense of Coherence (SOC), as described in the theory of salutogenesis, particularly if it was identified in the experience of women who described that they were ageing well.

This thesis applied qualitative longitudinal analyses of data, and Thematic Analysis was used to identify the main themes described by older women during the period in which they were participants in the ALSWH. A conceptual model was developed, and was applied to the data, which were free-text comments. The main findings from the thesis were:

- that women reported a wide range of stressors throughout their ageing process
- women described resources which they could access and use appropriately to counter the negative forces of stressors, and to minimise the reaction of stress that could follow
- many women reported that despite the challenges of ageing, they found ways to manage the circumstances of life, and reported that they were indeed ageing well.

The main implications of the findings were that a SOC is an orientation that views life in a way that implements a flexible approach in managing life's events and associated stressors. As such, the development of a strong SOC should be seen as a useful strategy, which can be developed during early life experiences, and can continue to be strengthened across the life course. The SOC showed evidence of being appropriate to both individual and community experiences.

The role of diet in the prevention of maternal pregnancy complications

PhD candidate: Danielle Schoenaker

Supervisors: Professor Gita Mishra and Dr Sabita Soedamah-Muthu

The University of Queensland

Background and aims: The increasing trend in prevalence of the two most common obstetric complications, gestational diabetes mellitus (GDM) and hypertensive disorders of pregnancy (HDP), is a growing clinical and public health concern globally. Prevention of GDM and HDP is of major importance for reducing the associated immediate adverse maternal and perinatal outcomes, as well as the longer-term and intergenerational predisposition to adverse health risks for mothers and their children. Dietary modification is known to affect a range of cardio-metabolic conditions, and may therefore also contribute to prevention of GDM and HDP. Current evidence on the effect of diet on GDM and HDP risk is, however, insufficient to guide the development of practical primary preventive strategies.

This thesis aimed to 1) synthesise current evidence from intervention and observational studies on the role of diet in the prevention of GDM and HDP, and 2) add to the existing evidence by examining associations of pre-pregnancy dietary patterns with the development of GDM and HDP among reproductive-aged women.

Methods: Multiple data sources and analytical methods were used. Systematic reviews and meta-analyses were conducted to summarise current evidence from randomised controlled trials (RCTs) and observational studies, and to identify knowledge gaps in the published literature. Data from the 1973-78 cohort of the ALSWH were used to examine prospective associations between pre-pregnancy dietary patterns and GDM (N = 3,853) and HDP risk (N = 3,582). In this population-based cohort study, dietary intake was assessed using a validated food frequency questionnaire administered in 2003 when the women were aged 25-30 years. During nine years of follow-up, validated self-reported doctor diagnosis of GDM and HDP were reported for each live birth using three-yearly surveys. Exploratory factor analysis was used to identify dietary patterns of non-pregnant women, and associations with GDM and HDP were examined using multivariable logistic regression with generalised estimating equations. To further explore and quantify the role of pre-pregnancy body mass index (BMI) as a causal mechanism of the relationship between pre-pregnancy diet and GDM and HDP, a counterfactual approach to mediation analysis was used.

Findings: The systematic review of evidence from RCTs identified 12 articles reporting on meta analyses and seven articles on recent single RCTs not included in these existing meta-analyses. Collectively, findings suggest that antenatal diet-based interventions may reduce the risk of GDM and HDP, particularly among high-risk women, and when initiated before or early in pregnancy. Pooled effect estimates consistently pointed towards risk reductions. However, effect sizes varied widely (16% to 61% for GDM and 10% to 84% for HDP) and not all results reached statistical significance. Antenatal combined diet and physical activity interventions failed to provide evidence for an effect on GDM and HDP risk (pooled risk ratio range: 0.85 to 1.18 for GDM and 0.84 to 1.16 for HDP). The diversity of results from dietary RCTs currently precludes the formulation of specific guidelines for clinical practice.

The systematic reviews of observational studies identified 34 articles reporting on associations between diet and GDM, and 38 articles on HDP. Consistent results were found for higher risk of GDM when 1% to 5% of energy from carbohydrates was replaced with fat, and with higher consumption of cholesterol (≥ 300 mg/day), haem iron (≥ 1.1 mg/day), red and processed meat (increment of 1 serve/day) and eggs (≥ 7 per week). Moreover, low intake of calcium (< 1000 mg/day) and fruit and vegetables (< 2 -5 serves/day) were associated with higher risk of HDP. Studies investigating overall diet, particularly prior to pregnancy, were lacking. In the ALSWH, we demonstrated that higher adherence to a Mediterranean-style dietary pattern prior to pregnancy was associated with a 44% lower risk of GDM (relative risk 0.56, 95% CI 0.41, 0.77) and a 42% lower risk of HDP (relative risk 0.58, 95% CI 0.42, 0.81) comparing the highest with lowest dietary pattern scores. A higher BMI before pregnancy explained 32% of the total effect of the Mediterranean-style dietary pattern on GDM risk, and 22% of the effect on HDP risk.

Conclusions: The current body of evidence from intervention and observational studies among pregnant women suggests that maternal dietary intake may affect risk of GDM and HDP. In addition to the potential role of diet during pregnancy, our population-based study of reproductive aged Australian women demonstrated that dietary patterns prior to entering pregnancy may have a role in preventing these major maternal pregnancy complications. Pre-pregnancy BMI was found to be an important pathway, explaining up to one-third of the relationship between the pre-pregnancy Mediterranean-style dietary pattern and GDM and HDP. Our study thereby indicates that the majority of this relationship was explained by other, potentially cardio-metabolic related, mechanisms. Given the potential for dietary intake, that is in line with existing dietary guidelines, to reduce rates of GDM and HDP, women of reproductive age should be encouraged to adhere to these dietary guidelines before and during pregnancy. Future studies are needed to determine the optimal timing, strategies, and target groups, for effective preventive interventions.

Data Archiving

ALSWH data are annually archived at the Australian Data Archive (ADA) at the Australian National University. To date, data have been archived for Surveys 1 to 4 of the 1989-1995 cohort, Surveys 1 to 7 of the 1973-1978 cohort, Surveys 1 to 7 of the 1946-1951 cohort, and Surveys 1 to 6 of the 1921-1926 cohort. The incomplete data from the ongoing six-month follow up survey (6MF) of the 1921-1926 cohort has also been archived. This year, data from Survey 7 of the 1973-1978 cohort and Survey 4 of the 1989-1995 cohort were archived.

Enquiries

University of Newcastle:

Professor Deborah Loxton

Deputy Director, Australian Longitudinal Study on Women's Health

Research Centre for Generational Health and Ageing

University of Newcastle, Callaghan NSW 2308, AUSTRALIA

Telephone: 02 4042 0690

Fax: 02 4042 0044

Email: info@alsw.org.au

University of Queensland:

A/ Professor Leigh Tooth

Deputy Director, Australian Longitudinal Study on Women's Health

School of Public Health

University of Queensland, Herston QLD 4006 AUSTRALIA

Telephone: 07 3346 4691

Fax: 07 3365 5540

Email: sph-wha@sph.uq.edu.au

www.alsw.org.au

A detailed description of the background, aims, themes, methods, and representativeness of the sample and progress of the study is given on the project website. Copies of surveys are also available on the website, along with contact details for the research team, abstracts of all papers published, papers accepted for publication, and conference presentations.