

Australian Longitudinal Study on Women's Health Annual Report 2019

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Introduction

Funded by the Australian Government Department of Health since 1995, the Australian Longitudinal Study on Women's 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.

ALSWH now involves more than 57,000 women in four cohorts that encompass the adult lifespan:

- Young women born 1989-95 (now aged 24-30 in 2019)
- Women born 1973-78 (now aged 41-46)
- Women born 1946-51 (now aged 68-73)
- Women born 1921-26 (now aged 93-98)

ALSWH strongly supports the use of linked data in health services research to provide evidence for evaluation of the use and impact of health services. Study data is currently linked with data from national administrative datasets (e.g., Medicare Benefits Schedule, Pharmaceutical Benefits Scheme, National Death Index, and Aged Care) as well as state/territory datasets (e.g., hospital admissions, perinatal data, and cancer registries).

This report outlines the Study's progress and achievements during 2019.

Directors Report

During the year, the 1989-95 cohort completed their sixth survey, the 1973-78 cohort completed their eighth survey, and the 1946-51 cohort began Survey 9. Women in the oldest cohort, born 1921-26 and now aged 93 to 98 years, continued to receive surveys at six-monthly intervals, with surveys sent in May and November. A major report presenting policy briefs on a range of women's health topics was prepared for the Australian Government Department of Health as background to the development of the National Women's Health Strategy. The report, 'Policy Briefs from the Australian Longitudinal Study on Women's Health' is available on the Study [website](#), and a summary is included in this report.

The data were also used to provide information to support government policy, including three reports on violence prepared for the Department of Social Services (which are listed in this report), submissions to the Productivity Commission of Inquiry into Mental Health, information to support the National Action Plan on Endometriosis, and submissions on health and wellbeing, and on pregnancy warnings labels on alcoholic beverages. A symposium, 'Linking Data to Inform Policy' was hosted by the Department of Health in Canberra. Opened by the Hon Greg Hunt MP, the Minister for Health, the symposium proved to be highly successful in showcasing the latest research from ALSWH for policymakers, civil servants, and researchers in attendance from across government.

In addition, 54 new projects using anonymised ALSWH data, including some with linked administrative data, involving national and international collaborators began during the year. Over 70 peer-reviewed scientific papers, on all aspects of women's health, were published or accepted for publication, and more than 50 presentations were made at national and international conferences.

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 24 years.

Professor Gita Mishra

Professor Julie Byles



Feature: 2019 Major Report – Policy briefs from the Australian Longitudinal Study on Women’s Health

The Study’s 2019 major report to the Department of Health provided policy briefs on major topics for women’s health and wellbeing. It draws on an array of ALSWH research work undertaken over the past decade that has been published with peer review and that provides sufficient evidence to warrant a series of policy recommendations. A summary of the report is provided here, the [full report](#) is available on the ALSWH website.

The topics of the policy briefs cluster into groups: *Mental health* and *Violence and abuse*; then *Sexual health*, *Reproductive health*, and *Pregnancy and maternal health*; those related to lifestyle and health behaviours - *Weight and weight gain*, *Nutrition*, *Physical activity and sedentary behaviour*; and lastly *Chronic conditions* and *Housing and care for older women*.

In overviewing these topics, it is important to emphasise the many common risk factors and overlapping effects of the issues covered. For instance, violence and abuse are associated with poor mental health; postnatal depression is a key issue for reproductive health and is closely linked with a prior history of depression; obesity has adverse implications for pregnancy complications and chronic diseases, such as diabetes; and there are strong connections between physical and mental health. It is also important to emphasise the common social determinants of many of these health needs and outcomes.

Main findings and recommendations

Mental health

Mental health is a major issue for Australian women, with anxiety symptoms being more prevalent than depressive symptoms across the ALSWH cohorts. The findings did suggest however, that unlike physical health, mental health improves with age, at least to age 85. Young women, who were aged 18-23 in 2013, reported the worst mental health of the ALSWH

cohorts: one in two reporting high to very high levels of psychological distress, with those with less than year 12 education having the highest prevalence. Recommendations are:

- Screening for mental health problems should be routine practice in all clinical settings because of the strong links with unhealthy behaviours, sexual and reproductive issues, and many chronic conditions.
- The high prevalence of mental health problems among young women underscores the importance of the Better Access MBS items. The availability of these items and other mental health support services should be improved for disadvantaged women, especially those living outside major cities.

Violence and abuse

Adversity in childhood includes abuse experiences, witnessing domestic violence, and living with household dysfunction; it has lifelong health implications. Of women born in 1973-78, 41% experienced some childhood adversity which was associated with higher GP, allied, and specialist healthcare costs (Medicare and out of pocket costs) in adulthood. Bodily pain, poor general health, and depression were associated with childhood sexual abuse. Across three cohorts (1989-95, 1973-78, and 1946-51) 16% to 26% of women reported having been in a violent relationship with a partner or spouse. Those who experienced domestic violence had consistently worse mental health over time; a deficit that persisted even after the abuse ceased. Young women also reported higher rates of unwanted sexual activity than older cohorts. It is recommended that:

- Experience of abuse at any stage in the life course has such a strong link to adverse health outcomes that health care professionals should talk to patients about childhood abuse, sexual abuse, domestic violence, and elder abuse in addition to medical conditions, in order to understand their needs.
- Prevention of domestic violence is a priority for improving women's health. However, even if domestic violence ceases, many women will continue to experience health problems associated with past abuse. There is a need to promote strategies to ameliorate this problem.
- The higher prevalence of domestic violence in non-metropolitan areas highlights the need to improve support services for these women.

Sexual health

Chlamydia was the most common sexually transmitted infection (STI) affecting young Australian women. The prevalence of ever having chlamydia increased from 1.7% in 1996 among women aged 18-23, to almost 12% among women aged 22-28 in 2017. Most young

women did not use condoms, and around 1 in 10 did not use any contraception during sexual intercourse. It is recommended that:

- The increase in prevalence of chlamydia in the last two decades means that additional and better campaigns are needed to increase knowledge of STIs and STI prevention among young women.
- Healthcare providers should be made aware that women at risk of developing STIs include those not in a long-term sexual relationships and who identify as bisexual or not exclusively heterosexual.
- Additional training on contraceptive-specific GP consultations is recommended to improve women's health care experiences and to ensure GPs adequately inform women about the range of contraception available and the potential side-effects.

Reproductive health

Reproductive health includes polycystic ovarian syndrome (PCOS), endometriosis, fertility, hysterectomy, natural menopause, menopausal symptoms, and the use of hormone therapy. Around 10% of Australian women reported either PCOS or endometriosis which are both associated with infertility, and almost 20% of women reported infertility by their early to mid-thirties. The rates of HPV vaccination were far higher in young women (83% of 18-23 year olds in 2013) than older women (2.4% of 31-36 year olds in 2009). The mean age of natural menopause was 51.4 years; 2.5% of women had early menopause (<45 years) and 8.1% had late menopause (56 years and over). Women who had hysterectomy or oophorectomy or used hormone therapy had higher risk of chronic conditions. It is recommended that:

- Given the low rate of HPV vaccine uptake among women who were not covered by the school-based program and the serious outcomes of HPV, consideration should be given to extending the age at which women can obtain subsidised HPV vaccination through the Pharmaceutical Benefits Scheme.
- Women who have had a hysterectomy should be carefully monitored by their doctors as they are at increased risk of chronic conditions.

Pregnancy and maternal health

Many women of reproductive age were not nutritionally prepared for pregnancy - 9 out of 10 Australian women reported consuming fewer than five fruit and vegetable portions per day. Higher diet quality before or during pregnancy was associated with a lower risk of adverse pregnancy outcomes such as gestational hypertension for the mother and low birth weight for the infant. Women who reported a history of depression and anxiety were more likely to report experiencing postnatal depression. Women who gave birth in the private maternity sector were

less likely to be assessed for psychosocial health during pregnancy. However, women who were asked about their emotional health were more likely to seek help and be referred for additional support. It is recommended that:

- Changes to Australia's Medical Benefits Schedule (MBS) items for obstetric services (including MBS items 16950, 16951, and 16407) to prioritise perinatal mental health alongside physical health and help drive practice change in the private sector. These changes should be accompanied by adequate training and resources, structured referral pathways for women, and supportive systems for staff.
- Data items on depression/anxiety screening in the antenatal period, psychosocial referral in the antenatal period, presence or history of a mental health condition (as well as items on alcohol use and domestic violence) should be included in the Perinatal National Minimum Dataset.
- Prevention, detection, and treatment of poor mental health prior to child bearing and during pregnancy are recommended to reduce the incidence of postnatal depression.
- Pre-pregnancy and antenatal health care consultations should be used to increase women's understanding of the risks associated with being overweight and obese, having a poor diet, and alcohol use for the woman and her baby.

Weight and weight gain

There were clear patterns of increasing weight among all but the oldest cohort. In 2015 over 50% of women in their late thirties/early forties were overweight or obese, and in 2017 over 40% of women in their early twenties were already in these weight categories. Despite a plethora of public health initiatives on weight and physical activity, obesity and overweight remain among the greatest threats to health in Australia. It is recommended that:

- More effective strategies are needed, focusing not just on childhood obesity, but on women and men of all ages. Based on previous campaigns that have been effective, these strategies should include substantial inter-sectoral actions in education, legislation, and taxation.
- Public health policies to control weight gain, overweight and obesity should include actions that target groups at greatest risk, including socioeconomically disadvantaged women.
- Following national guidelines for diet and physical activity should be better promoted as being among the best methods to reduce weight and weight gain.

Nutrition

Diet, including total energy intake, is a major determinant of body mass, overweight, and obesity and hence women's risk of reproductive problems and chronic disease. Yet most women did not meet the dietary guidelines, for instance only a small proportion (2%) of women consumed the recommended five daily servings of vegetables. Sociodemographic factors were associated with unhealthy eating, including living in rural and regional areas, lower education levels, and being unemployed. It is recommended that:

- To help women meet the recommended dietary guidelines, it is necessary to advocate a series of changes applicable at every meal, e.g. the dietary guidelines for vegetable intake could be achieved for most women by incorporating one extra serving at each of three daily meals.
- Policies and interventions to improve diet should focus on social and economic factors and general health-related behaviour for all age groups.
- Improving access to healthy foods in rural and regional areas, and for those with low incomes, could improve healthy eating and contribute to better health.
- Pre-pregnancy planning, pregnancy and parenthood provide key opportunities and motivation for women to improve their diet.

Physical activity and sedentary behaviour

In all but the oldest ALSWH cohort, born 1921-26, the majority of women reported weekly physical activity (PA) that met or exceeded national guidelines, but many did not. In the 1989-95 cohort around 30% of women did not meet PA guidelines, with this increasing to 40-50% for the 1973-78 and 1946-51 cohorts. The proportion not meeting guidelines was also high among pregnant women. It is recommended that:

- Strategies that aim to assist all women not currently meeting the guidelines of 150 minutes of PA per week to do so ('middle of the road' approach) would be better for reducing the incidence of chronic conditions, rather than aiming for an increase of 30 minutes by everyone ('whole population' approach), or an increase of 60 minutes by the least active women ('high risk' approach).
- Public health policies geared towards increasing adherence to PA guidelines (or increasing PA levels generally) should prioritise women of lower socioeconomic status, Asian-born women, women with children, women at risk of developing chronic conditions, and women with poorer mental health.

Chronic conditions

The rates of most chronic conditions increased with age and there were cohort/generational differences. For instance, in the 1946-51 cohort 14% of women reported diabetes by the age of 67, whereas the 1921-26 cohort did not reach this prevalence until the age of 81. Multimorbidity (that is, having two or more chronic conditions) also increased with age, with higher risk for women who were overweight or obese, had experienced short-term weight gain (over a 3 year period), and were socioeconomically disadvantaged. It is recommended that:

- Greater attention should be given to public health measures which aim to prevent and reduce risk factors for chronic conditions, including smoking, being overweight or obese, and weight gain. This is likely to reduce the burden of chronic conditions now and in the future.
- There is a need to encourage more women to engage in cancer screening and testing for risk factors for chronic conditions, with a corresponding improvement in access to health services for women living in regional and remote areas.
- Multimorbidity requires increased emphasis on integrated person-centred health care rather than multiple condition-specific management regimens. This is acknowledged in the National Strategic Framework for Chronic Conditions.

Housing and care for older women

Most women spent much of their later life in a house (61%), an apartment (13%), or a retirement village (6%). Others transitioned from a house or an apartment to a retirement village or residential aged care (RAC). Women living in retirement villages had higher rates of admission to RAC, but not higher use of home care services. Over a third of women entered RAC at some time, often in response to dementia or stroke, and remained in care for around 2-3 years. Driving remained the main means of transport for women in late life. It is recommended that:

- In the formulation and implementation of housing policy, the needs of older women should receive particular attention.
- Strategies to increase the use of community services in community settings and retirement villages may delay or prevent admission to residential aged care.
- RAC should be seen as an important stage in the women's life course, not only with attention to lifestyle, engagement, and ongoing wellbeing, but also anticipating their specific end of life needs and so avoiding unnecessary hospital admissions and treatments.

- Strategies to enable driver safety and/or to enable women to transition to other transport options are important for women's wellbeing.

Conclusion

These key recommendations are not intended as an exhaustive policy prescription – since they relate specifically to the evidence that has emerged from ALSWH – but as a series of items that should be included in the development and synthesis of future policy initiatives. This process should highlight where initiatives can be integrated in ways that focus on women at increased risk across a range of health issues and that will have multiple benefits.

Equally, this should not be seen as a limitation of the potential contribution from ALSWH to support women's health policy development. The strengths and value of this national flagship study need to be underscored, with over two decades of survey data linked with health services use and treatments. These longitudinal datasets enable the on-going monitoring of the trajectory of health and wellbeing, such as the decline in smoking rates and the rise in obesity that reflect changes in policy or the environment, including the factors that influence the differences seen in specific groups of women. The study continues to expand with the first collection of biomedical data, for the NHMRC funded Menarche to Pre-Menopause (M-PreM) project, to begin in 2020. In M-PreM, data collected from women in the 1973-78 cohort will be used to investigate how reproductive characteristics - such as timing of first period (menarche), period symptoms, and pregnancy - affect women's chances of having chronic diseases and poor health later in life.

This means that ALSWH is ideally placed for the further research needed to investigate the long term causes and consequences of health issues, including evaluating health services use, and to continue to provide policymakers with evidence regarding the efficacy of existing programmes and track implementation of proposed policy initiatives.

Feature: Endometriosis in Australian women

Author: Ingrid Rowlands

Endometriosis is a debilitating inflammatory disease, occurring when tissue that normally lines the uterus grows outside on other organs - typically around the pelvis - causing scarring, chronic painful periods, heavy menstrual bleeding, bowel and bladder pain, and possibly infertility. It is a major public health problem costing the Australian economy more than 7 billion dollars each year, largely due to the significant healthcare costs involved in managing the disease.

Many women who have endometriosis feel invisible because a low level of understanding about the condition has contributed to long diagnostic delays from 7 to 12 years. Diagnosis is challenging because symptoms can mimic other conditions, or are not recognised or dismissed by doctors. Diagnosis is complicated by the fact that surgery is required to make definitive diagnosis of endometriosis. Because surgery is invasive and not without risks, women may be unwilling or financially not capable of undergoing surgery. The challenges of diagnosis mean we currently know little about endometriosis.

In 2018, however, the Minister for Health, the Hon Greg Hunt MP announced the *National Action Plan for Endometriosis* to improve the awareness and understanding of the condition across the community and for health professionals. Part of the plan identified priorities for research into endometriosis including the need for data from relevant national sources to provide a better understanding of the disease. Reliable, up-to-date statistics for endometriosis were urgently needed to inform clinical guidelines, practice and policy decisions. ALSWH was identified as a unique data source with the capabilities to advance knowledge in the field. As part of the Plan, the Study was engaged to estimate – for the first time – the national prevalence of endometriosis in Australia. Previously, estimates were based on international studies.

To generate the estimates, we used data from the original young cohort of women born in the 70s who were aged 18 to 23 when they were first surveyed in 1996. This cohort of women has

been followed for more than 20 years now, and from Survey 2 onwards, have been asked if they have ever been diagnosed or treated by a doctor for endometriosis. This data was used to identify the number of women living with endometriosis in Australia.

Through sophisticated data linkage, we were able to combine data from multiple sources to estimate the prevalence of endometriosis. We counted the number of women in the longitudinal study who said they had been diagnosed by a doctor with endometriosis, and linked this information to their individual hospital and medication records, to determine the number of women affected by endometriosis. This was first time that this had been done in Australia.

We found that by the time they reached their 40s, 1 in 9 women had received a diagnosis of endometriosis.

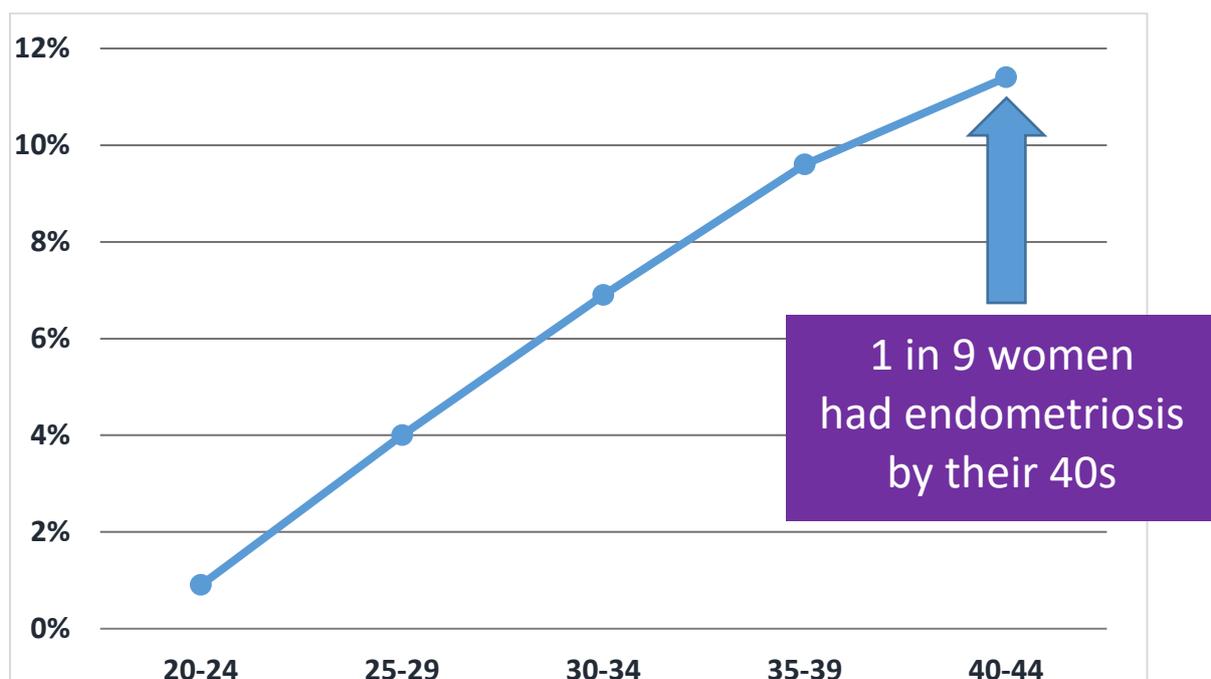


Figure 1: Women from the 1973-78 cohort diagnosed with endometriosis, from age 20-24 to age 40-44.

These statistics suggest that endometriosis is a relatively common condition among women. Importantly, the prevalence rate is similar to, or higher than, other chronic diseases including asthma (11%), diabetes (4%) and heart disease (4%).

Since a key clinical feature of endometriosis is chronic painful periods, we also looked at women's reports of period pain. Using our longitudinal data, we were able to look at women's

symptoms when they first entered the study in 1996 - when they were in their early 20s - many years before MOST of these women were diagnosed as having endometriosis. We found that women **without** endometriosis were most likely to say that they **never experienced** severe period pain when they were first surveyed in 1996. But women **with** endometriosis were more likely to say that they **OFTEN experienced** severe period pain at the first survey, many years before most of these women were formally diagnosed.

These data provide evidence of endometriosis as a major chronic disease in women. The prevalence figures have been recently published in the first national report on endometriosis in Australia, published by the Australian Institute of Health and Welfare¹.

And there is much more to be done – endometriosis remains a relatively unknown condition with long diagnostic delays that form a barrier to timely and appropriate healthcare. With ALSWH's longitudinal data, the next step is to identify these risk factors for the disease across the life course, which is essential to building a better understanding of the disease. This information will ultimately help us to optimise outcomes for women and contribute to the Government's national action plan for endometriosis.

References

1. AIHW (Australian Institute of Health and Welfare) 2019. [Endometriosis in Australia: prevalence and hospitalisations](#). Cat. No. PHE 247. Canberra: AIHW.

ALSWH Policy Symposium: Linking Data to Inform Policy

The Australian Government Department of Health hosted an ALSWH policy symposium in Canberra on 29 November 2019. The symposium provided an opportunity for researchers to present their research findings to Government and related agencies, and also presented a forum for discussion of potential future research directions of interest. Themes covered were:

Mental health

- **Mental health and health service use across the life course** (Prof Deborah Loxton)
- **Perinatal mental health** (Dr Nicole Reilly)
- **Maternal mental health and child outcomes.** (Dr Katrina Moss)

Maternal, sexual and reproductive health

- **Health from menarche to menopause** (Prof Gita Mishra)
- **Endometriosis** (Dr Ingrid Rowlands)
- **Sexual health** (Prof Jayne Lucke)

Healthy ageing

- **Healthy ageing and Aged Care** (Prof Julie Byles)
- **Prevalence and risk factors for dementia** (Prof Annette Dobson)
- **Caregiving across the life course** (A/Prof Leigh Tooth)

Chronic conditions and preventive health

- **Overview of multimorbidity** (Prof Annette Dobson)
- **Risk factors and adherence to guidelines** (Prof Gita Mishra & A/Prof Leigh Tooth)
- **Preventative activities** (Prof Julie Byles)

Health impacts of violence against women and girls, and impacts on the health system.

- **Health impact of Intimate Partner Violence across the life course** (Prof Deborah Loxton & Peta Forder)

New Projects in 2019

ALSWH data is available for use by approved researchers. Fifty-four collaborative projects using ALSWH data were approved in 2019 – the titles, lead collaborators, and synopses of the new projects are listed here.

A038B: Relationship between Body Mass Index, diet quality, physical activity and health service utilisation: An updated analysis.

- Prof Clare Collins, The University of Newcastle

This project is about evaluating whether healthy eating is associated with reduced health care costs. So far we have shown consuming a greater variety of vegetables to be predictive of lower 10-year cumulative Medicare charges, benefit, gap and fewer claims. We wish to check whether this relationship is strengthening over time, or not and to describe the relationship for those who improve their diet quality (or worsen) over time. This research may help to identify appropriate dietary targets associated with reduced health care costs. Further evaluations in other studies are needed so that modelling of potential future cost savings can be conducted. The results will inform a policy brief related to diet quality and healthcare costs over time.

A413A: Estrogen exposure index for post-menopausal women

- Shiva Mishra, The University of Queensland

Lifetime exposure to reproductive hormones may protect post-menopausal women from chronic disease and poor mental health. During their reproductive lives, many women are exposed to endogenous estrogen during pregnancy, and synthetic/exogenous estrogen in the form of oral contraception. The use of hormone replacement therapy by peri-menopausal women can provide additional exposure to synthetic estrogen. The aim of this project is to develop an estrogen exposure index (EEI) for post-menopausal women (i.e., the 1946-51 cohort), of whom 92% have had at least one pregnancy, and examine the relationship between

women's EEI and their post-menopausal risk of chronic disease, and well-being. Further, we will examine the predictive accuracy of EEI.

A522A: Are antenatal depression and anxiety risk factors for low birth weight?

- Dr Catherine Chojenta, The University of Newcastle

This project will examine the relationship between antenatal depression and antenatal anxiety and low birth weight for first time mothers. Low birth weight puts the infant at risk for adverse outcomes such as neonatal death, growth retardation and behavioural and developmental problems. While a number of modifiable risk factors for low birth weight have been identified (such as poor health behaviours), recent evidence suggests that poor mental health may play a role in poor obstetric outcomes. This project will examine the relationship between antenatal mental health and low birth weight, accounting for a range of other known risk factors.

A594A: The impact of general practice continuity of care on health service utilisation and costs.

- Dr Michael Wright, University Technology Sydney

This research investigates the relationship between general practice attendance patterns and health outcomes in order to provide evidence about the best way to deliver general practice services to get the best health outcomes. The initial focus of this research will be the association between continuity of care and recommended investigations (such as cancer screening, pathology and radiology testing), use of GP services, prescribing and secondary care utilisation (such as hospital admission and emergency department attendances).

A640B: Progression of chronic diseases and conditions in mid-aged women and beyond: the role of reproductive health over the life course and medication use.

- Xiaolin Xu, The University of Queensland

Multi-morbidity is a growing issue and poses a major challenge to health care systems around the world. A number of gaps in multi-morbidity research need to be addressed. This study aims to investigate the progression of chronic diseases and conditions in mid-aged women

and beyond from the ALSWH (1946-51) cohort. We aim to identify factors that are associated with disease progression and outcomes. We are particularly interested in how reproductive variables (e.g., age at menarche/menopause and number of children) influence the progression and outcomes as well as medication use and cost in this progression.

A684D: Health service use by women with dementia in the last two years of life.

- Prof Annette Dobson, The University of Queensland

There is growing concern world-wide about increasing prevalence of dementia and the burden and costs of caring for people with dementia, including their use of health and aged-care services. ALSWH has been commissioned by the Department of Health to conduct a study of the use of health and aged care services by women with various common chronic conditions in the last two years of their life. Dementia is one of these conditions and is the subject of this project.

A691A: Determinants of asthma in Australian children in the Australian Longitudinal Study on Women's Health

- Dr Karin English, The University of Queensland

This study will examine what factors are associated with childhood asthma. In the past decades the incidence of childhood asthma has been increasing, for reasons that are not fully understood. However, evidence suggests that the increasing incidence of asthma is a result of the interplay between changing environmental factors and genetics

A692A: Mental health and bone quality in Australian women.

- A/Prof Mark McEvoy, The University of Newcastle

The project explores the impact of depression and/or anxiety on new-onset osteoporosis and low-trauma fractures among older and mid-aged Australian women over 20 years. Epidemiological studies have shown a higher risk of osteoporosis and low-trauma fractures in

people with depression and/or anxiety than people without depression and/or anxiety. But the causal and temporal associations between these factors are yet to be established.

Alongside the ALSWH 1921-26 and 1946-51 birth cohorts' survey data, this project will use linked data for a better understanding of these relationships.

A696A: Unintended pregnancy and contraceptive use in women with chronic disease

- Dr Melissa Harris, The University of Newcastle

Unintended pregnancy remains high in developed countries despite access to high quality sexual and reproductive services. Some evidence exists that women with chronic diseases experience unintended pregnancy at significantly higher rates than women without chronic disease. For these women, unintended pregnancies are associated with serious adverse maternal and perinatal outcomes, including congenital abnormalities, pre-term labour, spontaneous abortion, and foetal death. Optimised preconception care and reproductive life planning is critical to the prevention of unintended pregnancies and reduction in pregnancy-related complications in women with chronic diseases. Little information exists in the Australian context. This projects aims to fill this knowledge gap.

A701A: Electronic cigarette and conventional cigarette smoking among Australian women

- Alemu Sufa Melka, The University of Newcastle

The dramatic physical, psychological and emotional changes that occur during late adolescence predisposes young people to problematic substance use. Tobacco smoking is a leading risk factor for many chronic diseases that include cancer, cardiovascular disease, chronic obstructive pulmonary disease and many others. Although smoking rates have declined globally over time, as of 2015 the annual global tobacco-related death rate is as high as 6 million. Australia is one of the countries on track in decreasing the prevalence of tobacco smoking over time. However, given population growth, the burden of disease associated with smoking is still high. The current study intends to examine electronic cigarette use and cigarette smoking using data collected from the 1989-95 cohort of the Australian Longitudinal Study on Women's Health (ALSWH).

A708B: Association between dietary flavonoid intake and hypertension and dementia in Australian women.

- A/Prof Karen Charlton, University of Wollongong

This study aims to evaluate dietary intake of flavonoids in prevalence and incidence of hypertension among women in different life stages. Secondary outcomes are to evaluate dietary intake of flavonoids in prevalence of mild cognitive impairment (MCI) and Alzheimer's disease/dementia and investigate association between hypertension and these conditions.

A733: Exploring the role of being overweight or obese in participation in mammographic breast screening in New South Wales: A validation of self-reported breast screening participation in the ALSWH.

- Dr Kate McBride, Western Sydney University

Overweight and obese women are at higher risk of breast cancer and worse outcomes, yet preliminary data indicates breast screening participation is lower in this group. Approximately 47% of the female NSW population is overweight or obese. This project intends to link BreastScreen NSW data with longitudinal BMI data from the 1946-51 cohort to examine how weight affects screening at different time points. This analysis is significant as it may identify a currently under-acknowledged high risk population who are not participating in breast-screening. This study will also validate self-reported ALSWH screening data.

A736A: Screen time in Australian children: Socioeconomic, maternal, parenting, time use and family environment factors associated with meeting screen time guidelines (Analysis of data from the MatCH study).

- A/Prof Leigh Tooth, The University of Queensland

Recently released guidelines from the Australian Government recommends maximum daily screen time for children aged 0 - <1, 1 - 2, 3 - 5 and 5 - 12 years. Previous Australian research has linked screen time in children with socioeconomic factors in their parents (for example years of education) as well as with parenting style and home environment, however the

majority of this research has investigated this issue in older children, has not linked long standing maternal factors and has not examined associations between and within families. This research aims to determine the associations between children's screen time and sleep, diet, physical activity, physical and cognitive development, quality of life, behaviour, maternal factors, parenting styles and the home environment.

A737A: The association of lifestyle factors with longitudinal weight gain in women with and without polycystic ovary syndrome

- A/Prof Lisa Moran, Monash University

Polycystic ovary syndrome is a condition affecting up to 1 in 5 reproductive-aged women associated with reproductive, metabolic and psychological complications. Obesity worsens the prevalence and features of PCOS, and women with PCOS have been shown to have a higher prevalence of obesity and greater weight gain over time compared to women without PCOS. Women with PCOS have also been shown to have higher energy intake, be less physically active and sit for longer, however it is not known how much these differences in lifestyle factors contribute to the differences in obesity.

A757A: The health system costs of women who experience domestic violence

- Dr Jananie William, Australian National University

Our project investigates the health services used by women who experience domestic violence and the corresponding health system costs of these services. The health system costs refer to government-funded expenditure through Medicare and relate to both in-patient hospital and out-of-hospital care (such as general practitioner visits). We will also consider costs through the Pharmaceutical Benefits Scheme. The results will be used to inform health policy and domestic violence services to ultimately better support affected women.

A772: Patterns of long-term antidepressant use.

- Dr Maria Donald, The University of Queensland

Antidepressants are an effective treatment for acute major depressive disorders but they are often also used for mild or moderate depression for which evidence of effectiveness is lacking. An emerging body of research suggests that treatment discontinuation be considered for some long-term users of antidepressants, especially those with mild to moderate depression treated in the community. Australia has the second highest antidepressant prescribing rate in the world and the average duration of treatment is considerably longer than the guideline-recommended six to twelve months. This suggests that attempts to cease antidepressants for a number of patients are either not occurring as frequently as guidance recommends, and/or attempts are unsuccessful. Our study aims to better understand the patterns of long-term antidepressant use.

A773: Evaluation of the Consumer Directed Care (CDC) initiative in Australia.

- Prof Brenda Gannon, The University of Queensland

Our study evaluates a new aged care policy implemented in Australia since 2013 - Consumer Directed Care (CDC). CDC aims to encourage older people to stay at home longer and be healthier. Despite growing literature on the impact of CDC, existing studies are limited to qualitative studies and randomized control trials where results are sometimes difficult to generalize to a larger population. Existing studies fail to control for individual unobserved heterogeneity (e.g., preferences). We use differences-in-differences (DiD) in a large panel dataset to assess the short and long-term effects of the CDC on health, well-being and health care utilization.

A774: The impact of maternal adverse childhood experiences and violence in adulthood on women's health, parenting, and child outcomes.

- Dr Catherine Chojenta, The University of Newcastle

Research has shown that intimate partner violence adversely impacts on the physical and mental health of women over the life course and can have deleterious effects on outcomes for children exposed to this violence. Studies have also demonstrated a generational effect on offspring of mothers who experienced adverse childhood experiences (ACES) while growing up. This project will align these fields of research by examining the potential cumulative impact of maternal exposure to adverse childhood experiences and violence across the life course on outcomes for women in the 1973-1978 cohort and their children.

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A775: Mental and physical health trajectories among women in midlife.

- Dr Karin Hammarberg, Monash University

Australia's population is ageing and women over 50 will soon be the largest demographic group. Maintaining and promoting the health of women as they age is vital to the Australian economy and for the maintenance of family and community structures. To inform health policy

and health promotion strategies, the aim is to describe the social, situational, financial, physical, and psychological factors that predict physical and mental health and wellbeing in women over age 50 using ALSWH data collected over 20 years from women born between 1946 and 1951 who were aged between 45 and 50 years when they completed the first survey.

A776: Habitual lifestyle of Australian women with PCOS.

- Dr Anju Joham, Monash University

Polycystic ovary syndrome (PCOS) is a complex hormonal disorder commonly affecting one in five women and one in four Australian Indigenous women. PCOS is associated with many health complications including reproductive, metabolic and psychologic factors. Women with PCOS are prone to weight gain and excess weight exacerbates the clinical features of PCOS. Lifestyle management is the recommended first-line treatment for women with PCOS. We intend to study the habits and lifestyles of Australian women with PCOS to identify potential barriers to a healthy lifestyle.

A777: Women's health across the lifespan: A person-centered approach.

- Prof Michael Hendryx, Indiana University

Health outcomes often do not result from a single variable or cause, but rather result from the combined effects of many variables. This project will use a statistical approach called person-centered modelling to examine co-occurring effects of social, economic, behavioural, and environmental variables on women's health across the lifespan. Health outcomes to be investigated include incidence of diabetes, cardiovascular disease and birth outcomes.

A778: Parity and mode of birth and their relationship to general and gynaecological health.

- Prof Deborah Davis, University of Canberra

As 32.3 percent of all deliveries in Australia are caesarean sections, it is important to address the long term consequences of this procedure. This project will compare self-perceived

general health, emotional wellbeing and different gynaecological complications such as irregular periods, severe period pain, heavy periods, urinary incontinence, and surgery for hysterectomy, prolapse of vagina, bladder and bowel in groups of Australian women that have delivered vaginally, by caesarean section or not at all.

A779: Life course weight trajectory and risk of breast cancer.

- Prof Juhua Luo, Indiana University

This project will use a life-course approach to examine the associations between weight trajectory patterns and subsequent risk of breast cancer. In addition to examining the overall impacts of distinct BMI trajectory patterns on breast cancer risk, we will further explore impacts of various BMI metrics over the life course (for those women who became obese after baseline), such as age at onset of obesity, duration of being obese, and obese-years (product of the degree and the duration of obesity similar conceptually to packyears for smoking), on the risk of breast cancer.

A780: Endometriosis: Prevalence, health outcomes and health service use.

- Dr Ingrid Rowlands, The University of Queensland

Based on international data, endometriosis is clinically diagnosed in 10-13% of women. However, there are no current national, Australian estimates. This study estimates the prevalence of endometriosis (self-reported and surgically confirmed) in two cohorts of young women and describes women's long-term health outcomes and health service use. Data from women's self-reported doctor diagnoses of endometriosis from the ALSWH surveys will be combined with surgery data from Medicare Benefits Schedule and the state-based Admitted Patients Data collections to provide national estimates and examine outcomes.

A782: Stillbirth: Prevalence, menstrual problems, and future health outcomes.

- Prof Gita Mishra, The University of Queensland

In Australia, the rate of stillbirth is 6.7 per 1000 births. This is equivalent to 2,107 stillborn babies each year. Established risk factors include maternal health (hypertension, diabetes), primiparity, pregnancy complications (fetal growth restriction, prolonged pregnancy), smoking, overweight and obesity, and history of stillbirth. It is already known that women who experience pregnancy complications are more likely to report a cardiovascular disease related event, such as angina, heart attack, and arrhythmia, suggesting a link between adverse pregnancy events such as stillbirth and future health (Friebert et al. 2011). Lykke et al. reported that women who experience a pregnancy complication including a stillbirth in their first pregnancy are twice as likely to die prematurely.

In a Danish study, women with irregular menstrual cycles had an increased risk of preeclampsia, preterm birth, and prolonged pregnancy. Therefore, the characteristics of the preconception menstrual cycles may be a marker of both pregnancy outcomes and post-pregnancy health. Limited studies are available on the associations between preconception menstrual patterns and stillbirth. Similarly, there is a lack of information on changes in the physical and mental health of women who have had stillbirth, or on their GP use.

We hypothesize that menstrual problems might be early indicators of increased risk of stillbirth and poorer health in the future.

A783: Effect of medication reviews on patient and health outcomes among older women.

- Prof Julie Byles, The University of Newcastle

In Australia, the Residential Medication Management Review (RMMR) is provided for people in aged care facilities, and the Domiciliary Medication Management Review (DMMR) is provided for community-dwelling older people. These services are remunerated by the Australian government and have been shown to improve medication use and patient-reported health outcomes. This study seeks to determine uptake of medication reviews among women of the ALSWH cohort of 1921-1926, and how they relate to overall medication use, particularly the use of inappropriate medications.

A784: Fast food consumption and allergy in children aged 5-12 years in Australia: Findings from the Mothers and their Children's Health (MatCH) study

- Leticia Watanabe Ribeira, The University of Queensland

Asthma and allergic diseases are an emerging health issue among Australian children. Currently, there is no cure for such atopic conditions, and the evidence around risk and protective factors is still limited. The Westernisation of lifestyle is likely to be favouring the rise of allergies and this includes changes in diet, particularly an increasing consumption of fast foods. This study aims to build on the evidence of the association between fast food intake and the outcomes of asthma and allergies in a representative sample of Australian children, who participated in the Mothers and their Children's Health (MatCH) study.

A785: Reproductive events and workforce participation across the life course.

- A/Prof Leigh Tooth, The University of Queensland

In Australia, women's workforce participation is lower than men's. Despite a narrowing of the gap in recent years, more men than women are in the workforce from age 20 onwards. For example, in 2016-17, 45% of employed women worked part time compared with 16% of employed men. This research aims to examine the role of gender specific health issues affecting women, such as reproductive events including child-birth, adverse pregnancy outcomes (miscarriage, stillbirth, preterm birth, low birth weight), disorders such as polycystic ovary syndrome, endometriosis, or symptoms including severe period pain, heavy menstrual bleeding or irregularity, and menopause (menopausal transitions and symptoms) on workforce participation at different stages of, and over, the life course.

A786: Spatial analysis of family, domestic and sexual violence (FDSV) and childhood trauma among Australian women

- Prof Deborah Loxton, The University of Newcastle

This project examines hotspots of violence among Australian women with respect to domestic violence, sexual violence, abuse and adversity in childhood, and any form of violence, summarising the spatial distribution and hotspots of violence across Australia.

A787: Intimate partner violence, reproductive outcomes and contraceptive use in the 1973-1978 and 1989-95 cohorts

- Prof Deborah Loxton, The University of Newcastle

Women are disproportionately at greater risk of family, domestic and sexual violence (FDSV), which is typically perpetrated by a current or previous partner, and usually takes place in their home. Women experiencing FDSV are less likely to have a planned pregnancy, or be able to make autonomous decisions about their contraceptive use. Using data from the 1973-78 and 1989-93 cohorts, we aim to examine the patterns of contraceptive use, and reproductive outcomes (including accidental pregnancy, miscarriage, termination and birth) for women who report experiencing intimate partner violence (IPV), versus those women who have not.

A789: The impact of general practice continuity of care on health service utilisation and costs

- Prof Deborah Loxton, The University of Newcastle

Experiencing violence or abuse can lead to negative health outcomes. There are many forms of violence and abuse that women may experience across their life course, including childhood abuse, intimate partner violence and elder abuse. While some women have never experienced such trauma, others have experienced multiple forms of abuse throughout their lives. This project aims to examine the relationship between different patterns of abuse and health outcomes, and to identify the factors that mitigate or exacerbate the impact of abuse on health.

A790: Life course weight trajectory and risk of type 2 diabetes

- A/Prof Juhua Luo, Indiana University

This project will use a life-course approach to examine the associations between weight trajectory patterns and subsequent risk of type 2 diabetes. For women who became obese after baseline, we will also explore impacts over the life course of various body mass index (BMI) metrics - such as age at onset of obesity, duration of being obese, and obese-years (product of the degree and the duration of obesity similar conceptually to pack-years for smoking) - on the risk of type 2 diabetes.

A791: Modifiable lifestyle behaviour differences between women who do shift work and those who do not

- Christie Bennett, Monash University

Circadian misalignment can influence metabolism of nutrients. Therefore, shift-workers have a higher prevalence of metabolic diseases. Women working shift work are also more susceptible to sleep disruption and metabolic outcomes associated with shift work. However, there is a lack of data on women working shift work and the possible influence shift work may have on metabolic outcomes and modifiable lifestyle behaviours.

This study will aim to investigate the following:

- i) Do women working shift work have a higher prevalence of metabolic outcomes (BMI and recently diagnosed non-insulin dependent T2DM, hypertension and heart disease) compared to those not working shift work?
- ii) Do women working shift work have poorer lifestyle behaviours compared to those not working shift work?

A792: Physical activity, sitting time and BMI: relationships with health care services, medicines, and health costs over 20 years in young and mid-age Australian women

- Prof Grace Gomes, The University of Queensland

Several ALSWH analyses have already examined associations between physical activity, sitting time and BMI with overall health care costs, both cross-sectionally and over shorter time periods. In this work we would like to examine the CUMULATIVE effects of these variables from 1996 to 2015/2016, and their JOINT associations with indicators of health service use, medicines and costs, in the 1973-78 and 1946-51 cohorts. For example, we know that costs are higher for women with high BMI; by how much does physical activity attenuate this effect? We suspect that sitting time may also be associated with higher costs, but is this relationship exacerbated by high BMI or attenuated by high physical activity?

Instead of focussing only on overall costs, in this work we would like to examine the linked data to assess relationships with actual use of health services (in broad groups, for example, annual number of GP visits, specialist visits, use of allied health services), PBS medicines (including examination of the top twenty most frequently used by each cohort), and hospital services. This study will analyse how patterns of physical activity, sitting time and BMI over 15-16 years are associated with use of health services and costs in the last 3-4 years (depending on availability of linked data). In other words, we want to see whether patterns of behaviours in the earlier years predict later use of health services, medicines, and costs in the young (1973-78) and mid-age (1946-51) cohorts. The results will inform the development of prevention and promotion strategies which may reduce health care costs in the long term.

A793: Urinary incontinence in women with and without polycystic ovary syndrome (PCOS)

- Dr Anju Joham, Monash University

Urinary incontinence affects up to one in two postmenopausal women and one in three premenopausal women. It causes great embarrassment and reduces quality of life. Reproductive hormones play a role in urinary continence but the mechanisms are not understood. Polycystic ovary syndrome (PCOS) is a complex hormonal disorder characterized by reproductive hormones dysregulation and insulin resistance. Women with PCOS are prone to weight gain and diabetes, both of which are important risk factors for urinary incontinence.

We intend to study the association of PCOS with urinary incontinence and how urinary incontinence impacts the mental and physical health of women with PCOS.

A794: Understanding how women have navigated financial abuse and the economic impacts of domestic and family violence (DFV).

- Rebecca Glenn, Domestic Violence Service Management

The intent of this project is to contribute to the understanding of financial abuse experienced by women in the intimate partner context. The project seeks to:

- understand the context for individual experiences of financial abuse, including broader patterns of violent, controlling or coercive behaviour by a woman's partner;
- reveal how social, service and system responses were helpful, unhelpful or harmful; and give visibility to women's first-hand accounts of navigating financial abuse and/or the economic impact of domestic and family violence (DFV).

A795: Hospital identified Antimicrobial Resistance (AMR) prevalence among older women in Australia

- A/Prof Tracy Comans, The University of Queensland

This research aims to look at the prevalence, treatment and pathways of transfer of older women identified with a UTI and subsequent or concurrent antimicrobial resistance (AMR). We will have a particular interest in those women residing within the residential aged care facilities (RACF) to identify patterns of patient movement between hospitals and RACF and association with AMR prevalence levels. We aim to use the findings of this study to build a scalable agent based model that will enable identification of cost and health effective interventions such as reduction in prescribed antibiotics

A796: Dental health in Australia – assessing the participatory, utilisation and health outcomes of the Chronic Disease Dental Scheme.

- Prof Jane Hall, University Technology Sydney

With calls to expand Medicare to include dental services and the noted fiscal costs associated with such an expansion, it is important to understand what the outcomes might be. The addition of the Chronic Disease Dental Scheme (CDDS) on Medicare between 2007 and 2013 represented an expansion of public health insurance to cover dental services for those with a chronic disease. This study will seek to identify the drivers of program participation, whether the CDDS increased the utilisation of dental services for the intended population, resulted in a change in dental health status and whether there was a reduction in the socioeconomic gradient associated with dental services utilisation. This study is important to informing future policy in relation to any proposed universal dental health scheme.

A797: The impact of multiple chronic conditions: Findings from the Australian Longitudinal Study on Women's Health

- Prof Annette Dobson, The University of Queensland

This work is for the ALSWH 2020 major report, a deliverable under the main contract for ALSWH with the Australian Department of Health. The report will examine the extent to which ALSWH participants experience multimorbidity, that is, the co-occurrence of more than one chronic condition. It will describe the prevalence of multiple conditions across the life course, and their impact on women's quality of life, use of health and other support services, and the costs.

A798: HPV vaccinations and adherence to screening

- Dr Xenia Dolja-Gore, The University of Newcastle

Free HPV vaccinations were introduced for Australian females aged 12-26 years in 2007, with free school based vaccination of 12-13 year old girls ongoing, and vaccination of boys introduced in 2013. This government initiative has dramatically decreased the prevalence of HPV in younger men and women. However, screening remains important to prevent cervical

cancer effectively amongst both vaccinated and unvaccinated women. We aim to determine factors that are associated with women not participating in cervical screening and assess the relationship between HPV vaccination and screening behaviour.

A799: Pregnancy planning and risk of adverse pregnancy and birth outcomes

- Dr Danielle Schoenaker, University of Wollongong

Preconception care addresses health and lifestyle behaviours of women prior to pregnancy, and is increasingly recognised as an essential health service to achieve healthy outcomes for women and their children. While previous studies have shown that better health and lifestyle prior to pregnancy are associated with better health outcomes during and after pregnancy, there remain gaps in our knowledge on the benefits and implementation of preconception care. To better inform the design of future preconception interventions, this study aims to examine the proportion of women planning a pregnancy, their preconception health and lifestyle behaviours, and the relationships of these with subsequent pregnancy and birth outcomes.

A800: Women's health services use across life

- Prof Annette Dobson, The University of Queensland

This project incorporates part of the work program for the NHMRC funded Centre for Research Excellence on Women and Noncommunicable Diseases (CRE-WaND): Prevention and detection.

This project pertains to Program B of CRE-WaND (describe women's current health service use across life) and forms part of the research to be undertaken under this Program (see also EOI#748). Women's use of health services show distinct patterns across life. These variations in health services use have resource implications and can help identify timely and targeted preventive health strategies and opportunities for changes in models of service delivery. A coordinated approach to the prevention and management of NCDs should build on existing health systems, enhanced by an understanding of the distinct patterns of health services use (including reproductive health services), by different risk groups of women.

A801: Perinatal mental health screening: progress over time and who is missing out

- Dr Katrina Moss, The University of Queensland

Maternal mental health issues are common in the perinatal period (during pregnancy and the first postnatal year), with up to 20% of women reporting anxiety, depression or stress. Poor maternal mental health is associated with poorer birth outcomes and poorer child development due to effects on parenting practices, impaired attachment between mother and child, and reduced physical care. Screening for perinatal mental health issues is the first critical step in a pathway of care. Australian clinical practice guidelines recommend routine mental health screening during pregnancy and after birth, but current screening rates and changes over time are unknown.

A802: Breastfeeding practices, child behaviour and development.

- Dr Katrina Moss, The University of Queensland

Infant feeding guidelines around the world recommend that babies are exclusively breastfed until approximately 6 months of age. However, in most countries this does not occur: breastfeeding is stopped before 6 months, or solids are introduced before 6 months (or both). This study aims to understand which women don't breastfeed exclusively to 6 months and why; whether infant feeding practices are related to child behaviour and development; and whether a woman's experiences feeding her first child influence how she feeds her second child. Findings will help us to identify women who may benefit from extra support, and may inform development of future policy initiatives such as the Australian National Breastfeeding Strategy for 2018 and Beyond.

A803: Influence of shift work on menopausal vasomotor symptoms, an analysis of the Australian Longitudinal Study of Women's Health

- Dr Qunyan Xu, University of South Australia

With the ageing workforce, many women are and will find themselves managing menopause transition during their employment. As a frequent complaint of menopausal transition,

vasomotor symptoms including hot flushes and night sweats pose challenges to various aspects of women's life such as sleep disturbance and social inconvenience. Shift work is a well recognised occupational risk with wide implications on individuals' health. Although much attention has been paid to understanding its impact on reproductive health outcomes including spontaneous pregnancy loss and menstrual disturbance, little is known about whether and how much shift work affects menopausal vasomotor symptoms in middle aged women.

A804: Ascertainment of parity in the ALSWH/MatCH cohorts using linked perinatal records.

- Colleen Loos, The University of Queensland

In 2016-17, the Mothers and their Children's Health (MatCH) study asked the 1973-78 ALSWH cohort about the health of their children (then aged under 13 years). Over 3,000 mothers (of 14,247 women originally enrolled in the ALSWH cohort in 1996) took part, reporting on 5,799 children. This project uses linked perinatal records for the whole 1973-78 cohort; and published data for same-aged women in the Australian population; to assess the representativeness of both MatCH and ALSWH, in terms of the number and ages of birth children.

A805: Sexual Violence and its impact on psychosocial wellbeing in women: A longitudinal analysis

- Dr Robyn Brunton, Charles Sturt University

This study will examine the relationship between the experience of sexual violence (SV) and psycho-social well-being for the 1973-78 cohort. Groups of women will be examined in relation to their SV experience against reported health, well-being and health-related behaviours. The study aims to track the groups across time according to SV experience, examining psychological outcomes and health behaviours. We also aim to examine psychosocial well-being before/after SV. Additionally, we will track the women in regards to the risk of re-victimization of SV as well as the occurrence of reported partner abuse. The mediating role of social support will also be explored (for the second and third aims) between SV, well-being and adverse outcomes.

A806: The role of healthy and unhealthy dietary patterns on depression in Australian women.

- Megan Lee, Southern Cross University

The role of nutrition in chronic lifestyle diseases such as cardiovascular disease and diabetes is well known. However, the role of nutrition in mental health is lesser known. In Australia, over 3 million people live with the symptoms of depression, with more women experiencing symptoms than men. Research suggests that dietary patterns rich in fresh fruit, vegetables, wholegrains, nuts, seeds, legumes, lean meat and water may protect against depressive symptoms and that dietary patterns high in processed, refined and sugary foods could contribute to the symptoms of depression. This project aims to examine the relationship between Australian women's dietary patterns and depression.

A807: Trajectories of psychological wellbeing in women with endometriosis

- Prof Kerry Sherman, Macquarie University

Despite a recent rapid increase in research concerning aetiology and treatment of endometriosis, there has been limited focus on understanding the experiences of women diagnosed with this condition. In particular, there is a dearth of research investigating the psychological impact of endometriosis over time. Prior analyses of data from the Australian Longitudinal Study on Women's Health has identified a high prevalence of psychological distress amongst women with endometriosis. Yet, no study to date has investigated psychological distress over time. As endometriosis is a chronic and cyclical condition, it is expected that as the condition progresses or changes, so too will the psychological health of those affected. Understanding how psychological distress changes over time, and describing the potential patterns of distress, will enable us to understand the experiences of this population more thoroughly. To address this gap in the literature, we aim to describe trajectories of psychological distress in women with endometriosis who have participated in the ALSWH.

A808: Joint growth mixture and survival analysis: Sitting, physical activity, and mortality

- Dr Borja del Pozo-Cruz, Australian Catholic University

Physical activity and, more recently, sitting time are suggested to be associated with all-cause mortality. However, much of the epidemiology arises from observational studies assessing physical activity and sitting time at a single point in time (at baseline), on subsequent mortality. This is problematic because relating mortality risks to baseline physical activity and/or sitting levels does not account for within-person variation over the long term, potentially diluting the epidemiological associations. We will investigate the associations between long-term physical activity and sitting trajectories and all-cause mortality in middle-age women. This is likely to result in more accurate estimates of the real impact that physical activity and sitting time may have on all-cause mortality.

A809: Patterns of contraceptive use among Australian women with mental health conditions

- Dr Natalie Amos, Monash University

The project will examine the associations between mental health disorders and patterns of contraceptive and emergency contraceptive use among young women in Australia. Using data from surveys 1 to 5 of the 1989-95 cohort we aim to understand patterns of contraceptive use among women with depression or anxiety, specifically the methods of contraceptive chosen, frequency of contraceptive use or non-use, occurrences of emergency contraceptive use and changes in contraceptive use over time.

A810: Incidence and predictors of Neonatal Near Miss, and its impact on parenting and child health outcomes in Australia

- Prof Deborah Loxton, The University of Newcastle

The concept of neonatal near miss (NNM), a condition where a newborn has nearly died but survived, has been proposed as a tool for assessment of quality of care in neonates who suffered any life-threatening condition. Research from other settings indicates that different

factors contribute to the incidence of NNM and children with NNM history are at risk of encountering various health and health related problems during their course of life. Research also has indicated that having a high risk infant poses significant family, societal and economic impacts; although this relationship is yet to be investigated with NNM. This project will align these areas of research by investigating the incidence and predictors of NNM, and its impact on parenting and child health outcomes.

A812: Women's health services use before and after diagnosis of a non-communicable disease (NCD)

- Prof Annette Dobson, The University of Queensland

Evidence that is more detailed is needed regarding the pattern of women's health service use across life, in particular the impact of a diagnosis of one or more non-communicable diseases (NCDs). This research will examine patterns of health service use before and after diagnosis of a NCD at different life stages, including the impact of subsequent additional NCDs and multi-morbidity.

Completed Student Projects

Ageing in place without children: A study of Australian women's experiences

PhD candidate: Cassie Curryer

Supervisors: Prof Julie Byles and Prof Mel Gray

Institution: The University of Newcastle

Some of the most important decisions and choices that individuals will face relate to later life and whether to remain living in their home or, alternatively, moving into residential aged-care. These decisions become more complex within the contexts of housing unaffordability, changing social and family structures, and rapidly shifting welfare and aged-care policy contexts.

Drawing on longitudinal free-text survey comments and interviews with women (born between 1946-1951), this qualitative study examined older women's housing and social circumstances, their experiences of late-life childlessness, and women's plans and expectations for housing and support.

The study found that many women made housing decisions within the contexts of family and social relationships. Friendships, belonging, shared histories, and support were highly valued. Half of women interviewed were adamant they would not move from their current residence, with residential aged-care seen as a last resort. Most women had not made plans beyond homeownership. Some criticised government policies that kept changing, particularly without regard to women's historical gender disadvantage. Consequently, women's preparations for later life might prove inadequate.

The value of continuity of care in Australian general practice

PhD candidate: Dr Michael Wright

Supervisors: Prof Jane Hall, A/Prof Kees Van Gool, and Prof Marion Hass

Institution: University Technology Sydney

This thesis investigates the relationship between continuity of general practice care and the quality of care received by patients, using the example of cancer screening. This thesis extends existing literature by investigating continuity of care with a GP (personal continuity), as well as practice level continuity (site continuity of care), and by the use of longitudinal data (including data from all cohorts in the Australian Longitudinal Study on Women's Health) and econometric techniques to control for biases. Results indicated that personal and site continuity of care are associated with different patient and practice demographics, and also that compared with patients attending multiple general practices, people who had personal or site continuity of care were statistically significantly more likely to have recommended cancer screening. These results demonstrate an association between continuity of care and cancer screening behaviour.

Cyclic perimenstrual pain and discomfort and the role of complementary and alternative medicine in its treatment

PhD candidate: Carole Fisher

Supervisors: Prof David Sibbritt and Prof Jon Adams

Institution: University Technology Sydney

Background: There is a high prevalence of cyclic perimenstrual pain and discomfort (CPPD) with up to 97% of women experiencing problems such as premenstrual syndrome (PMS) and dysmenorrhoea, during their menstruating years. This can impair women's ability to fully participate in all aspects of life. Conventional medicine has limitations in treating affected women and evidence suggests women are increasingly exploring complementary and alternative medicines (CAMs) for support.

Aims: To determine the associated use of CAM by women with CPPD, their user-rated efficacy and the significance this use may have for public health providers.

Method: A literature review of cross-sectional data provided a baseline of CAM use, and its associated efficacy, reported by women with CPPD. Patterns of CAM use and CPPD prevalence were examined using 2012 data collected from women aged 28 to 33 years in the Australian Longitudinal Study on Women's Health. This cohorts' changes in CAM use and associated CPPD from 2006 to 2012, provided further insights into this association.

Western herbal medicine emerged as one CAM favoured by women with CPPD. Western Herbalists (WHs) were surveyed on their perceptions of their treatment for CPPD regarding its efficacy, costs and duration and the herbs preferred in treating symptoms. An assessment based on clinical evidence was undertaken for the main nominated herbs.

Results: From the literature review, cross-sectional studies of CAM use for CPPD have increased sharply in recent years, however overall data were highly variable. Across studies, CPPD prevalence was high, with a mean prevalence of CAM used as treatment of 32% and up to 70% user-prevalence of herbal medicine. CAM efficacy was well rated, at between 33%-97%, mostly adopted through self-prescription. At least 41.2% of ALSWH participants experienced CPPD and frequent sufferers of PMS were significantly more likely to consult a naturopath/herbalist (OR = 2.11), or self-prescribe herbal medicines (OR = 1.72) compared to non-sufferers. Over the years 2006 to 2012 the only significant positive association found was for naturopath/herbalist consultations and women suffering PMS.

Between 61% and 84% of WHs rated their treatment of four common CPPD symptoms as 'always effective', this being highest for PMS. WHs' treatment appeared cost-effective and of short duration. However, scientific evidence for the main herbs used in CPPD treatment was limited.

Conclusion: CAM is increasingly being used by women to treat CPPD. Whilst herbal medicine may be an additional, effective and economical treatment, more well-designed, rigorous clinical trials are needed to confirm safety and efficacy before it gains mainstream credibility.

Health care use by older Australian women with asthma

PhD candidate: Dr Parivash Eftekhari

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

Institution: The University of Newcastle

Asthma prevalence is higher in Australia compared with global rates, with older women having the highest frequency of the disease. In older people, asthma is found to be a different phenotype, with more severe symptoms resulting in worse outcomes and higher mortality rates. Given that there is an increasing global trend in ageing, which is associated with elevated prevalence of chronic diseases (including asthma), and ageing of baby boomers in Australia, there is need for research on asthma in older populations, especially older women.

This thesis aimed to:

1. Investigate the impact of asthma on mortality for older women while considering confounding factors
2. Examine self-reported health service use for older women according to asthma status
3. Investigate cross sectional and longitudinal associations between asthma groups and self-reported health service use, adjusting for predisposing, enabling and needs factors
4. Examine Medicare records for health service use by older women according to asthma status
5. Investigate cross sectional and longitudinal associations between asthma groups and Medicare for health service use while also considering predisposing factors, enabling factors and needs.

Data from the 1946-51 and 1921-26 cohorts of the Australian Longitudinal Study on Women's Health linked with Medicare records were used in these analyses. Women were categorised into five mutually exclusive groups according to their asthma status (percentages shown for 1921-26 and 1946-51 cohorts respectively):

- Past asthma (4.2% and 6.4%)
- Prevalent asthma (8.5% and 10.2%)
- Incident asthma (5.3% and 8.9%)
- Bronchitis/emphysema (17.6% and 15.2%)
- Never asthma (64.4% and 59.3%)

Logistic regression and multinomial regressions were used to investigate the cross sectional associations between asthma groups and both self-reported and administrative health service use, taking into account the effect of predisposing, enabling and needs factors. Longitudinal analyses were conducted to investigate the association of asthma groups with health service use by older women over time, adjusting for repeated measures of predisposing, enabling and needs factors.

Findings showed that asthma was associated with higher mortality rates in older women from the 1921-26 cohort, even after taking into account the effect of confounding factors. Larger proportions of women with asthma in both cohorts had comorbidities including heart diseases, diabetes, anxiety and depression. Women with asthma were more likely to have reported visits to their GPs/family doctors in a year compared with women without asthma, even after adjusting for predisposing, enabling and needs factors.

These findings were corroborated by results from the Medicare records, showing that asthma was associated with more frequent and longer visits, even after taking into account the effect of predisposing, enabling and needs factors. Asthma was also associated with higher number of claims for specialist visits, after-hours GP visits, Chronic Disease Management (CDM) and Asthma Cycle of Care (ACC) items. After adjusting for asthma group, the use of these services were mostly driven by possessing private health insurance and comorbidities.

Although women with asthma had higher levels of health service use, the uptake of enhanced primary care items including assessments, CDM and ACC was low. Potentially, better uptake and application of services subsidised by these items could improve the impact of asthma on older women's quality of life and reduce asthma mortality rates in older women.

Middle-aged women with a hysterectomy: An exploration of trends, characteristics and mid-life health experiences

PhD candidate: Louise Wilson

Supervisors: Prof Gita Mishra and Prof Julie Byles

Institution: The University of Queensland

Background and aim: A hysterectomy is the surgical removal of a woman's uterus and is one of the most common gynaecological procedures performed worldwide. In Australia, an estimated 27% of women aged over 45 years have had a hysterectomy. Approximately 30%

of these women also had both ovaries removed at the time of surgery (bilateral oophorectomy).

Early and mid-life socioeconomic, reproductive and health behaviour characteristics may increase the risk of hysterectomy; however, there has been no systematic assessment of this evidence. In middle-aged women, hormone changes have been linked to greater severity of vasomotor menopausal symptoms, as well as poorer longer-term morbidity and mortality outcomes. Hysterectomy with bilateral oophorectomy results in immediate menopause and an abrupt reduction in hormone levels; hysterectomy with ovarian conservation has also been associated with reduced ovarian function and earlier menopause. Despite the high prevalence of hysterectomy in many countries there is limited longitudinal research that has investigated the mid-life health experiences of women with a hysterectomy.

This thesis examined the predictors, menopausal symptom profiles and health consequences of having a hysterectomy in Australian women, with the aim of contributing to the understanding and management of the post-surgery menopause transition by health practitioners and their patients, and to add to the knowledge-base on the consequences of this surgery.

Methods: Numerous data sources and analytic methods were used. Australian age-specific and age-standardised trends in hysterectomy incidence over the period 2000-2014 were assessed through Joinpoint regression. Systematic reviews and (where possible) meta-analyses were done on the associations between socioeconomic, reproductive and health behaviour factors and hysterectomy. Data from the 1946-1951 cohort of the Australian Longitudinal Study on Women's Health (ALSWH) were used to examine associations between hysterectomy status and vasomotor menopausal symptom patterns, depressive symptoms, perceived physical function and all-cause mortality. Analytic methods included the chi-square test, latent class analysis, multinomial logistic regression, generalised estimating equation (GEE) models, log-multinomial regression and inverse probability-weighted Cox survival models. A number of sensitivity analyses were done to test the robustness and reliability of the estimates, including multiple imputations for missing data.

Findings: Age-standardised hysterectomy rates in Australian women aged 25 years and over declined by 4% per year on average between 2000 and 2009; however, between 2009 and 2014 rates stabilised at approximately 47 hysterectomies per 10,000 women (25 years and over). Meta-analyses of population-based studies suggested that early life factors of younger age at menarche and lower education levels were associated with hysterectomy; however, there was considerable heterogeneity across the included studies. Using data from the 1946-

1951 cohort of ALSWH, the associations between hysterectomy status and four health outcomes were considered.

- Compared to women of the same age without a hysterectomy, women with a hysterectomy with ovarian conservation had higher odds of a constant pattern of hot flushes versus a minimal pattern of hot flushes (OR 1.97; 95% CI 1.64, 2.35) over a 17-year period, and constant versus minimal night sweats (OR 2.09, 95% CI 1.70, 2.55).
- Women who reported a hysterectomy with ovarian conservation and those who reported a hysterectomy and bilateral oophorectomy by the age of 50 years had a higher risk of incident depressive symptoms compared to women without a hysterectomy over 12 years of follow-up (RR 1.20; 95% CI 1.06, 1.36 and RR 1.44; 95% CI 1.22, 1.68 respectively). Use of menopausal hormone therapy (MHT) did not confer a protective effect.
- In an analysis of the associations between hysterectomy status and de novo substantial or moderate self-reported physical function limitations versus minimal limitations, women who reported a hysterectomy and bilateral oophorectomy had a higher risk of substantial limitations compared to women with no hysterectomy (RR 1.26; 95% CI 1.09, 1.46).
- After 21 years of follow-up, hysterectomy with ovarian conservation before the age of 50 years did not increase all-cause mortality risk. Hysterectomy with bilateral oophorectomy before the age of 50 years, in the absence of MHT use, was associated with a higher risk of death.

Conclusions: Hysterectomy continues to be a common surgical procedure in Australia with evidence of a stabilisation of rates between 2009 and 2014. In our population-based study of middle-aged Australian women, hysterectomy with ovarian conservation was associated with persistent vasomotor menopausal symptoms. Hysterectomy status was also associated with poorer mental and physical health over the longer term. These findings may have potential public health benefit by informing the development of appropriate monitoring, treatment pathways and proactive interventions for women with a hysterectomy in mid-life. However, this research could not establish that the associations between hysterectomy and the health outcomes considered were causal. Further research is needed to determine the potential causal associations between the antecedents to hysterectomy (including the indication for

surgery and prior treatment pathways) and health outcomes, and the degree to which hysterectomy acts as a mediator or independent risk factor in these relationships.

Longitudinal analysis of oral health status for Australian women

Masters candidate: Christopher Sexton

Supervisor: Dr Mark Jones

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Oral health related quality of life is a measure of a person's subjective perception of the functional, social and psychological well-being related to their oral cavity (Locker & Slade, 1994). Longitudinal studies of oral health status are rarely reported, with the majority of research instead using cross-sectional designs. The largest investigation into the oral health of Australians is the National Study of Adult Oral Health (Slade, et al., 2007); however, this study uses a sequential cross-sectional study design that enrolls new participants for each study. Also, the data collection process occurs very infrequently; the last collection was in 2004 and the next collection is proposed for 2018. Thus the Australian Longitudinal Survey for Women's Health (ALSWH) allows the ability to investigate the self-reported oral health of participants across multiple surveys while investigating potential determinants of oral health, including socioeconomic status, private health insurance, location and smoking status.

The aims of this project were to:

- 1) Investigate the changes of self-reported oral health from baseline through three subsequent surveys
- 2) Explore whether location and/or access to a concession card and/or private health insurance status have an impact on oral health outcomes across the future surveys
- 3) Examine the effect of smoking status at baseline on self-reported oral health across the subsequent surveys.

Data was collected through Surveys 5 (2007), 6 (2010), 7 (2013) and 8 (2016) of the ALSWH cohort born 1946 to 1951. Although data was available from previous surveys, Survey 5 was the first to include measures of oral health and so it was treated as the baseline survey.

The results indicate that there is strong evidence that self-reported oral health improves over time. Specifically:

- Baseline oral health is a very strong predictor of subsequent oral health.

- Over time, the proportion of people who rate their oral health as positive increases;
- The proportion of participants who rate their oral health as excellent or very good is likely to increase over time if they rated their oral health as good or worse at baseline
- Participants rating their oral health as fair or poor decreases over future surveys if they rated their oral health as good or worse at baseline; and
- The decreases in the fair or poor category proportions are greater than the slight increase in participants who rated their oral health as fair or poor if they rated their oral health as excellent or very good at baseline.

Participants that never smoke, are not eligible for a healthcare card, have private health insurance and live in areas with better access to services are more likely to have better self-rated oral health while controlling for the other factors. Also, participants were more likely to rate their oral health as excellent or very good in future surveys and there is significant difference between the odds of rating oral health as excellent or very good than fair or poor in Survey 8, when compared to baseline. Participants who were not eligible for a healthcare card and participants who were insured for private dental services were more likely to rate their oral health as better than good.

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This list includes the first named investigator or collaborator from all currently active projects using ALSWH data. For further information, please [visit the ALSWH website](#).

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Publications

Summary

During 2019, 73 papers were published or accepted for publication in peer reviewed academic journals. These publications covered a wide range of research themes, including:

- 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 2019 were chronic conditions, reproductive health, weight, nutrition and physical activity; ageing; and mental health. There were eleven publications using ALSWH and linked administrative data. Details of publications relevant to each theme are shown below, and a full list of publications begins on p.[79](#).

Chronic Conditions (23 Publications in total)

Diabetes (6 Publications)

Hendryx M, Luo J, Chojenta C & Byles J. **Exposure to heavy metals from point pollution sources and risk of incident type 2 diabetes among women: A prospective cohort analysis.** *International Journal of Environmental Health Research* <https://doi.org/10.1080/09603123.2019.1668545> (Epub 2019).

Kakoly NS, Earnest A, Teede HJ, Moran LJ and Joham AE. **The impact of obesity on the incidence of type 2 diabetes among women with polycystic ovary syndrome.** *Diabetes Care*, 2019, 42(4); 560-567.

Looman M, Schoenaker D, Soedamah-Muthu SS, Mishra GD, Geelen A, & Feskens EJM. **Pre-pregnancy dietary micronutrient adequacy is associated with lower risk of developing gestational diabetes in Australian women.** *Nutrition Research*, 2019, 62; 32-40.

Luo J, Hodge A, Hendryx M & Byles JE. **Age of obesity onset, cumulative obesity exposure over early adulthood and risk of type 2 diabetes.** *Diabetologia*, (accepted for publication).

Rayner J, D'Arcy E, Ross LJ, Hodge A & Schoenaker DAJM. **Carbohydrate restriction in midlife is associated with higher risk of type 2 diabetes among Australian women: A cohort study.** *Nutrition, Metabolism and Cardiovascular Diseases*, (accepted for publication).

Wubishet BL, Harris ML, Forder PM, Acharya SH & Byles JE. **Predictors of 15-year survival among Australian women with diabetes from age 76–81.** *Diabetes Research and Clinical Practice*, 2019, 150; 48-56.

Cancer (5 Publications)

Arriaga M, Vajdic CM, MacInnis RJ, Canfell K, Magliano DJ, Shaw JE, Byles JE, Giles FF, Taylor AW, Gill TK, Hirani , Cumming RG, Mitchell P, Banks E, Marker J, Adelstein BA, Laaksonen M. **The burden of pancreatic cancer in Australia attributable to smoking.** *Medical Journal of Australia*, 2019, 210(5); 213-220.

Arriaga ME, Vajdic CM, Canfell K, MacInnis R, Banks E, Byles JE, Magliano DJ, Taylor AW, Mitchell P, Giles GG, Shaw JE, Gill TK, Klaes E, Velentzis LS, Cumming RG, Hirani V, Laaksonen MA. **The preventable burden of breast cancers for premenopausal and**

postmenopausal women in Australia: A pooled study. *International Journal of Cancer*, 2019, 145(9), 2383-2394.

Laaksonen MA, Arriaga ME, Canfell K, MacInnis RJ, Byles JE, Banks E, Shaw JE, Mitchell P, Giles GG, Magliano DJ, Gill TK, Klaes E, Velentzis LS, Hirani V, Cumming RG & Vajdic CM. **The preventable burden of endometrial and ovarian cancers in Australia: A pooled cohort study.** *Gynecological Oncology*, 2019, 153(3), 580-588.

Laaksonen MA, MacInnis R, Canfell K, Giles GG, Hull P, Shaw JE, Cumming RG, Gill TK, Banks E, Mitchell P, Byles JE, Magliano DJ, Hirani V, Connah D & Vajdic CM. **The future burden of kidney and bladder cancers preventable by behaviour modification in Australia: A pooled cohort study.** *International Journal of Cancer*, (online publication 2019). <https://doi.org/10.1002/ijc.32420> .

Tollosa DN, Tavener M, Hure A & James EL. **Compliance with multiple health behaviour recommendations: A cross-sectional comparison between female cancer survivors and those with no cancer history.** *International journal of environmental research and public health*, 2019, 16(8), 1345.

Musculoskeletal (2 Publications)

de Luca K, Wong A, Eklund A, Fernandez M, Byles JE, Parkinson L, Ferreira ML & Hartvigsen J. **Multisite joint pain in older Australian women is associated with poorer psychosocial health and greater medication use.** *Chiropractic & Manual Therapies*, 2019, 27, 8.

Engel RM, de Luca K, Graham P, Kaboli Farshchi M, Vemulpad S & Byles J. **Breathing difficulty, chest and back pain predict bronchitis and emphysema in women.** *Respirology*, 2019, 24(1); 72.

Cardiovascular Conditions (5 Publications)

Buziau AM, Soedamah-Muthu SS, Geleijnse JM & Mishra GD. **Total fermented dairy food intake is inversely associated with cardiovascular disease risk in women.** *Journal of Nutrition*, 2019, 149(10); 1797-1804.

Jackson JK, Patterson AJ, MacDonald-Wicks LK, Forder PM, Blekkenhorst LC, Bondonno CP, Hodgson JM, Ward NC, Holder C, Oldmeadow C, Byles JE & McEvoy MA. **Vegetable nitrate intakes are associated with reduced self-reported cardiovascular-related complications within a representative sample of middle-aged Australian women, prospectively followed up for 15 years.** *Nutrients*, 2019, 11(2), 240.

Jackson JK, MacDonald-Wicks LK, McEvoy MA, Forder PM, Holder C, Oldmeadow C, Byles JE & Patterson AJ. **Better diet quality scores are associated with a lower risk of hypertension and non-fatal CVD in middle-aged Australian women over 15 years of follow-up.** *Public Health Nutrition*, 2019, <https://doi.org/10.1017/S1368980019002842>

Zhu D, Chung HF, Pandeya N, Dobson AJ, Hardy R, Kuh D, Brunner EJ, Bruinsma F, Giles GG, Demakakos P, Lee JS, Mizunuma H, Hayashi K, Adami HO, Weiderpass E & Mishra GD. **Premenopausal cardiovascular disease and age at natural menopause: A pooled analysis of over 170,000 women.** *European Journal of Epidemiology*, 2019, 34(3), 235-246.

Zhu D, Chung H-F, Dobson A, Pandeya N, Giles GG, Bruinsma F, Brunner EJ, Kuh D, Hardy R, Avis NE, Gold EB, Derby CA, Matthews KA, Cade JE, Greenwood DC, Demakakos P, Brown DE, Sievert LL, Anderson D, Hayashi K, Lee JS, Mizunuma H, Tillin T, Simonsen MK, Adami H-O, Weiderpass E & Mishra GD. **Age at natural menopause and risk of incident cardiovascular disease: A pooled analysis of individual patient data.** *The Lancet Public Health*, 2019, 4(11); e553-e564.

Respiratory conditions (2 Publications)

Engel RM, de Luca K, Graham P, Kaboli Farshchi M, Vemulpad S & Byles J. **Breathing difficulty, chest and back pain predict bronchitis and emphysema in women.** *Respirology*, 2019, 24(1); 72.

Hendryx M, Luo J, Chojenta C & Byles JE. **Air pollution exposures from multiple point sources and risk of incident chronic obstructive pulmonary disease (COPD) and asthma.** *Environmental Research*, 2019, 179; Art. No. 108783.

Multimorbidity (3 Publications)

Xu X, Mishra GD & Jones M. **Trajectories of mental health symptoms for women in their 20s predict the onset of chronic physical conditions in their 30s: Two decades of follow-up of young Australian women.** *Journal of Affective Disorders*, 2019, 246; 394-400.

Xu X, Mishra GD & Jones M. **Depressive symptoms and the development and progression of physical multimorbidity in a national cohort of Australian women.** *Health Psychology*, 2019, 38(9); 812-821.

Xu X, Mishra GD & Jones M. **Short-term weight gain is associated with accumulation of multimorbidity in mid-aged women: A 20-year cohort study.** *International Journal of Obesity*, 2019, 43(9); 1811-1821.

Reproductive Health (22 Publications)

Adane AA, Tooth L & Mishra G. **The role of offspring's birthweight on the association between pre-pregnancy obesity and offspring's childhood anthropometrics: A mediation analysis.** *Journal of Developmental Origins of Health and Disease*, 2019, 10(5); 570-577.

Anderson DJ, Chung HF, Seib CA, Dobson AJ, Kuh D, Brunner EJ, Crawford SL, Avis NE, Gold EB, Greendale GA, Mitchell ES, Woods NF, Yoshizawa T, Mishra GD. **Obesity, smoking, and risk of vasomotor menopausal symptoms: a pooled analysis of eight cohort studies.** *American Journal of Obstetrics and Gynecology*, 2019, <https://doi.org/10.1016/j.ajog.2019.10.103>.

Bennett CJ, Cain SW & Blumfield ML. **Monounsaturated fat intake is associated with improved sleep quality in pregnancy.** *Midwifery*, 2019, 78, 64-70.

Chojenta C, William J, Martin MA, Byles J & Loxton D. **The impact of a history of poor mental health on health care costs in the perinatal period.** *Archives of Women's Mental Health*, 2019, 22(4); 467-473.

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Tobacco, Alcohol, and other Drugs (4 Publications)

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Linked Data (10 Publications)

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Published Papers

Adane AA, Tooth LR & Mishra GD. **The role of offspring's birthweight on the association between pre-pregnancy obesity and offspring's childhood anthropometrics: A mediation analysis.** *Journal of Developmental Origins of Health and Disease*, 2019, 10(5); 570-577.

While birthweight of offspring is associated with pre-pregnancy body mass index (BMI) and later risk of obesity, its mediating effect between the association of maternal pre-pregnancy BMI and offspring's childhood anthropometrics has rarely been investigated. This study aimed to examine whether offspring birthweight is a mediator in the association between pre-pregnancy BMI and offspring's childhood anthropometrics. The study included 1,618 mother-child pairs from the Australian Longitudinal Study on Women's Health and Mothers and their Children's Health Study. Children's anthropometrics [mean age 8.6 (s.d. =3.0) years] were calculated from the mothers' self-reported child weight and height measures. G-computation was used to estimate the natural direct and indirect (via birthweight) effects of pre-pregnancy BMI. In the fully adjusted model for maternal sociodemographic and lifestyle factors, the natural direct effects of pre-pregnancy obesity on child BMI-for-age, height-for-age, weight-for-age and weight-for-height outcomes were, β (95% confidence interval, CI), 0.75 (0.55, 0.95), 0.13 (-0.07, 0.32), 0.62 (0.44, 0.80) and 0.57 (0.24, 0.90), respectively. The corresponding natural indirect effects were 0.04 (-0.04, 0.12), -0.01 (-0.09, 0.07), -0.01 (-0.08, 0.07) and 0.09 (-0.05, 0.23). Similar results were observed for pre-pregnancy overweight and pre-pregnancy BMI as a continuous scale. Most of the effect of pre-pregnancy obesity on childhood weight-related anthropometric outcomes appears to be via a direct effect, not mediated through offspring's birthweight.

In general terms, this study aimed to determine how strongly a mother's weight before she became pregnant or a child's weight when it was born contributed to the child's weight later in childhood. The findings showed that a mother's weight before she became pregnant, especially if she was obese, was a stronger contributor to the weight of her child at 8½ years of age than how much the child had weighed at birth. It is possible that this may reflect shared lifestyles within families. For instance, mothers' food choices and taste preferences may influence their children's dietary habits in a number of ways. Therefore, childhood obesity prevention should mainly target pre-pregnancy obesity and other factors shared between the mother and child.

Anderson DJ, Chung HF, Seib CA, Dobson AJ, Kuh D, Brunner EJ, Crawford SL, Avis NE, Gold EB, Greendale GA, Mitchell ES, Woods NF, Yoshizawa T & Mishra GD. **Obesity, smoking, and risk of vasomotor menopausal symptoms: a pooled analysis of eight cohort studies.** *American Journal of Obstetrics and Gynecology*, 2019; <https://doi.org/10.1016/j.ajog.2019.10.103> (Available online 6 November 2019).

Background: Frequent and severe vasomotor symptoms during menopause are linked with adverse health outcomes. Understanding modifiable lifestyle factors for the risk of vasomotor menopausal symptoms is important to guide preventive strategies.

Objective: We investigated the associations between body mass index and smoking, and their joint effects with the risk of vasomotor symptoms, and whether the associations differed by menopausal stage.

Study Design: The International Collaboration for a Life Course Approach to Reproductive Health and Chronic Disease Events pooled data on 21,460 midlife women from eight studies (median age 50 years, interquartile range 49–51 years) for the cross-sectional analysis. Four studies provided data for the prospective analysis (n=11,986). Multinomial logistic regression models with four categories of frequency/severity for the outcome of vasomotor symptoms were used to estimate relative risk ratios (RRR) and 95% confidence intervals (CI) adjusted for within-study correlation and covariates.

Results: At baseline, nearly 60% of the women experienced vasomotor symptoms. Half of them were overweight (30%) or obese (21%), and 17% were current smokers. Cross-sectional analyses showed that a higher body mass index and smoking more cigarettes with longer duration and earlier initiation were all associated with more frequent or severe vasomotor symptoms. Never smokers who were obese had a 1.5-fold (RRR, 1.52; 95% CI, 1.35–1.73) higher risk of often/severe vasomotor symptoms, compared with never smokers who were of normal-weight. Smoking strengthened the association as the risk of often/severe vasomotor symptoms was much greater among smokers who were obese (RRR, 3.02; 95% CI, 2.41–3.78). However, smokers who quit before 40 years of age were at similar levels of risk as never smokers. Prospective analyses showed a similar pattern, but the association attenuated markedly after adjustment for baseline vasomotor symptoms. Furthermore, we found that the association between body mass index and vasomotor symptoms differed by menopausal status. Higher body mass index was associated with increased risk of vasomotor symptoms in pre- and perimenopause but with reduced risk in postmenopause.

Conclusion: High body mass index (≥ 25 kg/m²) and cigarette smoking substantially increased women's risk for experiencing frequent or severe vasomotor symptoms in a dose-response manner, and smoking intensified the effect of obesity. However, the effect of body mass index on the risk vasomotor symptoms was opposite among postmenopausal women. Maintaining a normal weight before the menopausal transition and quitting smoking before age 40 years may mitigate the excess risk of VMS in midlife.

Arriaga ME, Vajdic CM, Canfell K, MacInnis RJ, Banks E, Byles JE, Magliano DJ, Taylor AW, Mitchell P, Giles GG, Shaw JE, Gill TK, Klaes E, Velentzis LS, Cumming RG, Hirani V, Laaksonen MA. **The preventable burden of breast cancers for premenopausal and postmenopausal women in Australia: A pooled cohort study.** *International Journal of Cancer*, 2019, 45(9). doi: 10.1002/ijc.32231

Estimates of the future breast cancer burden preventable through modifications to current behaviours are lacking. We assessed the effect of individual and joint behaviour modifications on breast cancer burden for premenopausal and postmenopausal Australian women, and whether effects differed between population subgroups. We linked pooled data from six Australian cohort studies (n = 214,536) to national cancer and death registries, and estimated the strength of the associations between behaviours causally related to cancer incidence and death using adjusted proportional hazards models. We estimated exposure prevalence from representative health surveys. We combined these estimates to calculate Population Attributable Fractions (PAFs) with 95% confidence intervals (CIs), and compared PAFs for population subgroups. During the first 10 years follow-up, there were 640 incident breast cancers for premenopausal women, 2,632 for postmenopausal women, and 8,761 deaths from any cause. Of future breast cancers for premenopausal women, any regular alcohol consumption explains 12.6% (CI = 4.3-20.2%), current use of oral contraceptives for ≥ 5 years 7.1% (CI = 0.3-13.5%), and these factors combined 18.8% (CI = 9.1-27.4%). Of future breast cancers for postmenopausal women, overweight or obesity (BMI ≥ 25 kg/m²) explains 12.8% (CI = 7.8-17.5%), current use of menopausal hormone therapy (MHT) 6.9% (CI = 4.8-8.9%), any regular alcohol consumption 6.6% (CI = 1.5-11.4%), and these factors combined 24.2% (CI = 17.6-30.3%). The MHT-related postmenopausal breast cancer burden varied by body fatness, alcohol consumption and socio-economic status, the body fatness-related postmenopausal breast cancer burden by alcohol consumption and educational attainment, and the alcohol-related postmenopausal breast cancer burden by breast feeding history. Our results provide evidence to support targeted and population-level cancer control activities

Arriaga M, Vajdic CM, MacInnis RJ, Canfell K, Magliano DJ, Shaw JE, Byles JE, Giles FF, Taylor AW, Gill TK, Hirani, Cumming RG, Mitchell P, Banks E, Marker J, Adelstein BA, Laaksonen M. **The burden of pancreatic cancer in Australia attributable to smoking.** *Medical Journal of Australia*, 2019, 210(5); 213-220.

Objective: To estimate the burden of pancreatic cancer in Australia attributable to modifiable exposures, particularly smoking.

Design: Prospective pooled cohort study.

Setting, participants: Seven prospective Australian study cohorts (total sample size, 365 084 adults); participant data linked to national registries to identify cases of pancreatic cancer and deaths.

Main outcome measures: Associations between exposures and incidence of pancreatic cancer, estimated in a proportional hazards model, adjusted for age, sex, study, and other exposures; future burden of pancreatic cancer avoidable by changes in exposure estimated as population attributable

fractions (PAFs) for whole population and for specific population subgroups with a method accounting for competing risk of death.

Results: There were 604 incident cases of pancreatic cancer during the first 10 years of follow-up. Current and recent smoking explained 21.7% (95% CI, 13.8–28.9%) and current smoking alone explained 15.3% (95% CI, 8.6–22.6%) of future pancreatic cancer burden. This proportion of the burden would be avoidable over 25 years were current smokers to quit and there were no new smokers. The burden attributable to current smoking is greater for men (23.9%; 95% CI, 13.3–33.3%) than for women (7.2%; 95% CI, –0.4% to 14.2%; $P = 0.007$) and for those under 65 (19.0%; 95% CI, 8.1–28.6%) than for older people (6.6%; 95% CI, 1.9–11.1%; $P = 0.030$). There were no independent relationships between body mass index or alcohol consumption and pancreatic cancer.

Conclusions: Strategies that reduce the uptake of smoking and encourage current smokers to quit could substantially reduce the future incidence of pancreatic cancer in Australia, particularly among men.

Bennett CJ, Cain SW & Blumfield ML. **Monounsaturated fat intake is associated with improved sleep quality in pregnancy.** *Midwifery*, 2019, 78; 64-70.

Objective: To investigate the relationship between sleeping behaviour and macronutrient intake of pregnant women.

Design: Cross-sectional analysis of data collected in 2009 as part of the Australian Longitudinal Study on Women's Health.

Setting: Australia

Participants: Australian pregnant women ($n = 437$, aged 31–36) enrolled in the Australian Longitudinal Study on Women's Health who completed Survey 5 in 2009.

Measurements: Pregnant women self-reported sleep and dietary data. Latent class analysis derived sleep patterns. Relationships between sleep and diet were investigated through multivariate linear regression controlling for confounders including: area of residence, body mass index, depression, difficulty managing on income, education level and parity.

Findings: Latent class analysis identified three sleeping behaviour patterns: (LC1) average sleep (~7.8 h) with no adverse sleep-related symptoms ($n = 167$); (LC2) average sleep (~8.3 h) with adverse sleep symptoms ($n = 193$); and (LC3) short sleep (~6.6 h) with adverse sleep symptoms ($n = 97$). After adjusting for potential confounders, LC2 was associated lower percentage energy (%E) total fat ($b = -0.032$, $p = 0.039$) and %E monounsaturated fat ($b = -0.050$, $p = 0.005$) and higher intake of %E carbohydrate ($b = 0.031$, $p = 0.020$), compared to LC1. No differences were found between LC1 and LC3.

Key conclusions: Higher monounsaturated fat intake, at the expense of carbohydrate intake, may prove protective against poor sleep quality in pregnancy.

Implications for practice: Antenatal support provided by health professionals should consider the

important relationship between dietary intake and sleeping behaviour. Encouraging pregnant women to improve their sleep quality may prove an important strategy to optimise dietary intake during pregnancy and consequently improve the health outcomes for both mother and child.

Byles JE, Rahman MM, Princehorn EM, Holliday EG, Leigh L, Loxton D, Beard J, Kowal P & Jagger C. **Successful ageing from old to very old: A longitudinal study of 12,432 women from Australia.** *Age and Ageing*, 2019, 48(6); 803-810.

Objectives: We examined the development of disease and disability in a large cohort of older women, the extent to which these conditions exempt them from being classified as successful agers and different trajectories of disease, disability and longevity across women's later life.

Methods: We used survey data from 12,432 participants of the 1921–26 birth cohort of the Australian Longitudinal Study of Women's Health from 1996 (age 70–75) to 2016 (age 90–95). Repeated measures latent class analysis (RMLCA) identified trajectories of the development of disease with or without disability and according to longevity. Bivariate analyses and multivariable multinomial logistic regression models were used to examine the association between participants' baseline characteristics and membership of the latent classes.

Results: Over one-third of women could be considered to be successful agers when in their early 70s, few women could still be classified in this category throughout their later life or by the end of the study when they were in their 90s (~1%). RMLCA identified six trajectory groups including managed agers long survivors (9.0%) with disease but little disability, usual agers long survivors (14.9%) with disease and disability, usual agers (26.6%) and early mortality (25.7%). A small group of women having no major disease or disability well into their 80s were identified as successful agers (5.5%). A final group, missing surveys (18.3%), had a high rate of non-death attrition. Groups were differentiated by a number of social and health factors including marital status, education, smoking, body mass index, exercise and social support.

Conclusions: The study shows different trajectories of disease and disability in a cohort of ageing women, over time and through to very old ages. While some women continue into very old age with no disease or disability, many more women live long with disease but little disability, remaining independent beyond their capacity to be classified as successful agers.

Buziau AM, Soedamah-Muthu SS, Geleijnse JM & Mishra GD. **Total fermented dairy food intake is inversely associated with cardiovascular disease risk in women.** *Journal of Nutrition*, 2019, 149(10); 1797-1804.

Background: The relation between fermented dairy consumption and type 2 diabetes mellitus (T2DM) and cardiovascular disease (CVD) in an Australian population remains to be established.

Objectives: The aim of this study was to investigate the association between fermented dairy consumption and T2DM and CVD risk.

Methods: The Australian Longitudinal Study on Women's Health included Australian women (aged 45-50 y) at baseline in 2001, who were followed up through 5 surveys until 2016. Dietary intake was assessed through the use of a validated 101-item FFQ at baseline. Main study outcomes were self-reported physician-diagnosed T2DM and CVD. Logistic regression models adjusted for sociodemographic and lifestyle factors were used to estimate the association between dairy intake and T2DM and CVD risk.

Results: Of 7,633 women free of diabetes at baseline, 701 (9.2%) developed T2DM during a maximum 15-y follow-up period. Women in the highest tertile of yogurt intake had lower adjusted odds of T2DM than those in the lowest tertile (OR: 0.81; 95% CI: 0.67, 0.99; P = 0.041). This relation became nonsignificant after adjustment for dietary variables and total energy intake (OR: 0.88; 95% CI: 0.71, 1.08; P = 0.21). Of 7679 women free of CVD at baseline, 835 (10.9%) cases of CVD were reported during follow-up. High intake of yogurt and total fermented dairy was associated with lower CVD risk (OR: 0.84; 95% CI: 0.70, 1.00; P = 0.05, 0.80; 0.67, 0.96; 0.017, respectively) than observed in the lowest tertile of dairy product intake. Additional adjustment attenuated the relation (OR: 0.87; 95% CI: 0.72, 1.04; P = 0.13, 0.83; 0.69, 1.00; 0.048, for yogurt and total fermented dairy, respectively). No associations were found with other dairy groups.

Conclusion: The findings from this population-based study of Australian women suggest an inverse association between total fermented dairy intake and CVD risk, which may partly be accounted for by other dietary components.

Coombe J, Loxton D, Tooth L & Byles J. "I can be a mum or a professional, but not both": What women say about their experiences of juggling paid employment with motherhood. *Australian Journal of Social Issues*, 2019; 1-9.

Past research has identified the salience of the notion of 'good motherhood' in countries such as Australia, where women are expected to invest significant time and energy, often through self-sacrifice, to raise their children. We analysed free-text comments provided in response to an open-ended question from the Australian Longitudinal Study on Women's Health (ALSWH) to examine whether the discourse of 'good motherhood' played any role in how women articulate their experiences of juggling paid employment with motherhood. Participants from the cohort born 1973-78 who had children were included. 'Good motherhood' underpinned many of the accounts about combining motherhood with paid employment. Women reported life as stressful and hectic as they attempted to juggle the demands of childcare with paid employment and domestic chores. Although some identified 'good motherhood' as an unachievable ideal, most were largely unable to disengage with this discourse. Broader social structures, such as inflexible working conditions, were found to reinforce and support this ideal, contributing to the strength of the discourse. Traditional gender norms continue to underscore the division of labour in Australian households where women provide the majority of childcare and undertake the majority of domestic chores, regardless of whether they also engage in paid employment or not.

Cordier R, Chen Y-W, Clemson L, Byles J & Mahoney N. **Subjective memory complaints and difficulty performing activities of daily living among older women in Australia.** *Australian Occupational Therapy Journal*, 2019, 66(2); 227-238.

Background/aim: Increased age and cognitive decline have been linked to difficulties with activities of daily living (ADL) and instrumental activities of daily living (IADL). Cognitive decline can often be signalled by complaints about one's cognition, such as memory. With older Australians living longer, there is an increasing proportion of the population at risk of declined performance in daily tasks. The aim of this study was to identify if subjective memory complaints in later life among older women predict changes in independence in performing ADL and IADL.

Methods: Data were from 3721 women born 1921–1926, who completed Surveys 4–6 of the Australian Longitudinal Study on Women's Health. Memory complaints and difficulties on ADL were measured at each survey, using the Memory Complaint Questionnaire and 16 questions regarding specific ADL. Latent growth modelling examined correlations between initial scores on each measure, changes in measures, and the association between memory complaints and changes in ADL and IADL.

Results: There was a significant association between baseline scores for subjective memory difficulty and baseline ADL and IADL scores. Initial memory difficulty was also associated with increase in ADL and IADL difficulty.

Conclusions: Subjective memory complaints may be a risk factor for decline in performance on ADL. Attention to these concerns may be important in identifying functional decline in older age.

Chojenta C, William J, Martin MA, Byles J & Loxton D. **The impact of a history of poor mental health on health care costs in the perinatal period.** *Archives of Women's Mental Health*, 2019, 22(4); 467-73.

The perinatal period is a critical time for mental health and is also associated with high health care expenditure. Our previous work has identified a history of poor mental health as the strongest predictor of poor perinatal mental health. This study aims to examine the impact of a history of poor mental health on health care costs during the perinatal period. Data from the 1973-1978 cohort of the Australian Longitudinal Study on Women's Health (ALSWH) were linked with a number of administrative datasets including the NSW Admitted Patient Data Collection and Perinatal Data Collection, the Medicare Benefits Scheme and the Pharmaceuticals Benefits Scheme between 2002 and 2011. Even when taking birth type and private health insurance status into account, a history of poor mental health resulted in an average increase of over 11% per birth across the perinatal period. These findings indicate that an investment in prevention and early treatment of poor mental health prior to child bearing may result in a cost saving in the perinatal period and a reduction of the incidence of women experiencing poor perinatal mental health.

de Luca K, Wong A, Eklund A, Fernandez M, Byles JE, Parkinson L, Ferreira ML & Hartvigsen J. **Multisite joint pain in older Australian women is associated with poorer psychosocial health and greater medication use.** *Chiropractic & Manual Therapies*, 2019, 27; 8.

Background: Musculoskeletal pain frequently occurs in more than one body region, with up to 80% of adults reporting more than one joint pain site in the last 12 months. Older people and females are known to be more susceptible to multiple joint pain sites, however the association of multisite joint pain with physical and psychosocial functions in this population are unknown.

Methods: Cross-sectional data from 579 women were analyzed. Women were asked “Which of your joints have been troublesome on most days of the past month?” Pain qualities were measured using the McGill Pain Questionnaire (Short Form) and PainDETECT, and health was assessed using the SF-36 and sociodemographic variables. Statistical analysis using generalized ordinal logistic regression included comparison of three joint pain groups: no joint pain, 1–4 sites of joint pain and ≥ 5 sites of joint pain.

Results: Two thirds of respondents had multisite pain (>1 site), and one third had ≥ 5 joint pain sites. Compared to women with fewer joint pain sites, women with >5 joint pain sites (multisite joint pain) had significantly poorer physical and emotional health-related quality of life, more severe pain, a higher probability of neuropathic pain, and a longer duration of pain. More than half of women in the multisite joint pain group were still employed, statistically significantly more than women with no joint pain. In the final model, pain duration, the number of medications, pain intensity (discomforting and distressing) and the physical component of health-related quality of life were significantly associated with increased number of joint pain sites.

Conclusions: Over one-third of older women in our sample had >5 painful joints in the last month. These women demonstrated significantly poorer psychosocial health, and increased medication use, than women with no or fewer sites of joint pain. Many women with multisite joint pain were still in the workforce, even when nearing retirement age. This study has important implications for future research into musculoskeletal pain, particularly in regards to women’s health and wellbeing, and for clinical practice where there should be increased awareness of the implications of concurrent, multisite joint pain.

Dunneram Y, Chung HF, Cade JE, Greenwood DC, Dobson AJ, Mitchell ES, Woods NF, Brunner EJ, Yoshizawa T, Anderson D & Mishra G. **Soy intake and vasomotor menopausal symptoms among midlife women: A pooled analysis of five studies from the InterLACE consortium.** *European Journal of Clinical Nutrition*, 2019, 73(11); 1501-1511. DOI: 10.1038/s41430-019-0398-9.

Background/objectives: Phytoestrogen rich-foods such as soy may be associated with less frequent/severe vasomotor menopausal symptoms (VMS), although evidence is limited. We thus investigated the associations between the consumption of soy products and soy milk and the frequency/severity of VMS.

Subjects/methods: We pooled data from 19,351 middle-aged women from five observational studies

in Australia, UK, USA, and Japan that contribute to the International Collaboration for a Life course Approach to reproductive health and Chronic disease Events (InterLACE). Information on soy consumption, VMS and covariates were collected by self-report. We included 11,006 women who had complete data on soy consumption, VMS and covariates at baseline for the cross-sectional analysis. For the prospective analysis, 4522 women who were free of VMS at baseline and had complete data on VMS at follow-up were considered. Multinomial logistic regression and binary logistic regression models were used.

Results: No statistically significant evidence of an association was found between soy products (relative risk ratio (RRR): 0.92, 95% CI: 0.76–1.11) or soy milk (RRR: 1.24, 95% CI: 0.93–1.65) and the likelihood of reporting frequent or severe VMS cross-sectionally. Prospective results indicated that frequent consumption of soy products (odds ratio (OR): 0.63, 95% CI: 0.45–0.89) but not soy milk (OR: 1.11, 95% CI: 0.85–1.45) was associated with lower likelihood of reporting subsequent VMS, after adjustment for socio-demographic and reproductive factors.

Conclusions: These are the first ever findings from pooled observational data of association between consumption of soy products and VMS.

Engel RM, de Luca K, Graham P, Kaboli Farshchi M, Vemulpad S & Byles J. **Breathing difficulty, chest and back pain predict bronchitis and emphysema in women.** *Respirology*, 2019, 24 (1); 72.

Introduction/Aim: Introduction/Aim: Progressive loss of respiratory function often attributed to normal ageing, may be delayed if the early signs of chronic respiratory disease can be identified. Apart from a history of smoking, the ability to predict the development of conditions such as chronic obstructive pulmonary disease has proven elusive. The aim of this study was to identify potential predictors of bronchitis or emphysema in women.

Methods: A retrospective analysis of data from the middle cohort (born 1946-51) of the Australian Longitudinal Study on Women's Health (ALSWH) was conducted to identify baseline (survey 1: year 1996) predictors of bronchitis or emphysema at survey 8 (year 2016) using logistic regression models. Predictors included difficulty breathing, chest pain, back pain and limitations in walking various distances.

Results: Of the 13,715 women enrolled in the 1946-51 cohort of ALSWH at baseline, 8,622 completed Survey 8. Results showed a dose-response relationship for breathing difficulty, implying those with greater difficulty early in life were more likely to be diagnosed with bronchitis or emphysema later in life compared to those without breathing difficulty (Rarely: Odds ratio (OR):2.534 95%CI: 2.064, 3.100, $p<0.001$; Sometimes: OR:3.271, 95%CI:2.669, 3.997, $p<0.001$; Often: OR:6.271, 95%CI:4.617, 8.430, $p<0.001$ respectively). Similar results were seen for chest pain and back pain. Compared to those who were not limited in walking 1 kilometre, those who were limited a little or a lot were significantly more likely to be diagnosed with bronchitis or emphysema ($p<0.001$).

Conclusion: In women, breathing difficulty, chest and back pain at age 45-60 years are statistically significant predictors for a diagnosis of bronchitis or emphysema later in life. The presence of dose-

response relationships suggests that earlier management of these symptoms may improve prognosis. Encouraging women to walk could also reduce their future risk of being diagnosed with bronchitis or emphysema.

Fitzgerald D, Hockey R, Jones M, Mishra G, Waller M and Dobson A. **Use of online or paper surveys by Australian women: Longitudinal study of users, devices, and cohort retention.** *Journal of Medical Internet Research*, 2019, 21(3); e10672.

Background: There is increasing use of on-line surveys to improve data quality and timeliness, and to reduce costs. While there have been numerous cross-sectional studies comparing responses to on-line or paper surveys, there is little research from a longitudinal perspective.

Objective: In the context of the well-established Australian Longitudinal Study on Women's Health, we examined the patterns of responses to on-line or paper surveys across the first two waves of the study in which both modes were offered. We compared: 1. Differences between women born in 1946-51 and in 1973-78; 2. Types of device used for on-line completion; 3. The socio-demographic, behavioral and health characteristics of women who responded on-line or using mailed paper surveys; 4. Associations between mode of completion of the first survey, and participation and mode of completion in the second survey.

Methods: Participants in this study, who had responded to regular mailed surveys since 1996, were offered a choice of completing surveys using paper questionnaires or web-based electronic questionnaires, starting in 2012. Two groups of women were involved: an older cohort born in 1946-51 and aged in their 60s, and a younger cohort born in 1973-78 aged in their 30s when the on-line surveys were first introduced. We compared women who responded on-line on both occasions, women who responded on-line at the first survey and used the paper version of the second survey, women who changed from paper to on-line, and those who used paper for both surveys.

Results: Of the 9663 women in their 60s who responded to one or both of the surveys, more than 50% preferred to continue with paper surveys (5290 at the first survey and 5373 at the second survey). If they chose the on-line version most used computers. In contrast, of the 8628 women in their 30s, more than 50% (4835) chose the on-line version at the first survey. While most favored computers to phones or tablets, many did try these alternatives at the subsequent survey. Many women who completed the survey on-line the first time preferred the paper version at the subsequent survey. In fact, for women in their 60s, the number who went from on-line to paper (n=1151) exceeded the number who went from paper to on-line (n=734). The on-line option was more likely to be taken up by better educated and healthier women. In both cohorts, women who completed paper surveys were more likely than on-line completers to become non-respondents at the next survey. Due to the large sample size almost all the differences were statistically significant with $P < .001$.

Conclusions: Despite the cost-saving advantages of on-line compared to paper surveys, paper surveys are likely to appeal to a different population of potential respondents, with different socio-demographic, behavioral and health characteristics and potentially greater attrition from the study. Not offering a paper version is therefore likely to induce bias in the distribution of responses unless

weighting for respondent characteristics (relative to the target population) is employed. Therefore, if mixed mode (paper or online) options are feasible, they are highly likely to produce more representative results than if only the less costly online option is offered.

Forder P, Rich J, Harris S, Chojenta C, Reilly N, Austin M-P & Loxton D. **Honesty and comfort levels in mothers when screened for perinatal depression and anxiety.** *Women and Birth*, 2019; <https://doi.org/10.1016/j.wombi.2019.04.001> (Available online 25 May 2019).

Purpose: To evaluate the degree of honesty and level of comfort reported by women when questioned about their emotional wellbeing during the perinatal period; to investigate if honesty and comfort are associated with perinatal depression or perinatal anxiety; and to examine the reasons why women may not always respond honestly.

Methods: Qualitative and quantitative data from 1597 women from the cross-sectional perinatal mental health substudy (part of the Australian Longitudinal Study on Women's Health) were analysed using a mixed methods approach.

Results: When questioned by their health practitioner about their emotional wellbeing in the perinatal period, 20.7% of women indicated they had not always responded honestly. Reasons for not being honest reflected four main themes: normalizing of symptoms/coping; negative perceptions (self-and others); fear of adverse repercussions; and fear of involvement of health services (trust and confidentiality). The 38.9% of women who did not feel comfortable when questioned by their health practitioner about their emotional wellbeing were four times more likely to report perinatal depression (odds ratio = 4.09; 95% confidence interval = 2.55, 6.57) and nearly twice as likely to report perinatal anxiety (odds ratio = 1.90; 95% confidence interval = 1.24, 2.94) than other women.

Conclusions: Women who are most likely to need mental health care during the perinatal period are also those least likely to be honest about their mental health. A non-judgemental, open and reassuring approach by clinicians may help to reduce the stigma and fears contributing to lack of honest responses, and improve early diagnosis and treatment of mental health problems.

Graves A, McLaughlin D, Leung J & Powers J. **Consent to data linkage in a large online epidemiological survey of 18-23 year old Australian women in 2012-13.** *BMC Medical Research Methodology*, 2019, 19; 235. <https://doi.org/10.1186/s12874-019-0880-z>

Background: Consent to link survey data with health-related administrative datasets is increasingly being sought but little is known about the influence of recruiting via online technologies on participants' consents. The goal of this paper is to examine what factors (sociodemographic, recruitment, incentives, data linkage information, health) are associated with opt-in consent to link online survey data to administrative datasets (referred to as consent to data linkage).

Methods: The Australian Longitudinal Study on Women's Health is a prospective study of factors affecting the health and well-being of women. We report on factors associated with opt-in consent to data linkage at the end of an online survey of a new cohort of 18–23 year old Australian women recruited

in 2012–13. Classification and Regression Tree analysis with decision trees was used to predict consent.

Results: In this study 69% consented to data linkage. The provision of residential address by the individual, or not (as a measure of attitudes towards privacy), was the most important factor in classifying the data into similar groups of consenters (76% consenters versus 47% respectively). Thereafter, for those who did not provide their residential address, the incentives and data linkage information that was offered was the next most important factor, with incentive 2: limited-edition designer leggings and additional information about confidentiality showing increases in consent rates over Incentive 1: AUD \$50 gift voucher: 60% versus 37%.

Conclusions: In young Australian women, attitudes towards privacy was strongly associated with consenting to data linkage. Providing additional details about data confidentiality was successful in increasing consent and so was cohort appropriate incentives. Ensuring that prospective participants understand the consent and privacy protocols in place to protect their confidential information builds confidence in consenting to data linkage.

Hill B, Ling M, Mishra G, Moran LJ, Teede HJ, Bruce L & Skouteris H. **Lifestyle and psychological factors associated with pregnancy intentions: Findings from a longitudinal cohort study of Australian women.** *International Journal of Environmental Research and Public Health*, 2019, 16(24); 5064. <https://doi.org/10.3390/ijerph16245094>

Background: Preconception is a critical time for the establishment of healthy lifestyle behaviours and psychological well-being to reduce adverse maternal and offspring outcomes. This study aimed to explore relationships between preconception lifestyle and psychological factors and prospectively assessed short- (currently trying to conceive) and long-term (future parenthood aspirations) pregnancy intentions.

Methods: Data from Wave 3 (age 25–30 years; n = 7656) and Wave 5 (age 31–36 years; n = 4735) from the Australian Longitudinal Study of Women's Health were used. Pregnancy intentions and parenthood aspirations were evaluated. Logistic regressions explored cross-sectional associations between demographic, lifestyle and psychological factors and pregnancy intentions/parenthood aspirations.

Results: In multivariable models, parity and marital status were associated consistently with pregnancy intentions and parenthood aspirations. Few lifestyle behaviours and no psychological factors were associated with pregnancy intentions. Alcohol intake was the only behaviour associated with aspirations to have a first child. Aspirations for a second/subsequent child were associated negatively with physical activity, sitting time, diet quality, lower anxiety and higher stress.

Conclusions: It appears that women are not changing their behaviours when they form a decision to try to conceive. Interventions are needed that address women's preconception needs, to optimise lifestyle and improve health outcomes for women and their families.

Hendryx M, Luo J, Chojenta C & Byles JE. **Air pollution exposures from multiple point sources and risk of incident chronic obstructive pulmonary disease (COPD) and asthma.** *Environmental Research*, 2019, 179; Art. No. 108783.

No abstract available.

Hendryx M, Luo J, Chojenta C & Byles J. **Exposure to heavy metals from point pollution sources and risk of incident type 2 diabetes among women: A prospective cohort analysis.** *International Journal of Environmental Health Research*, 2019. <https://doi.org/10.1080/09603123.2019.1668545>. (Epub ahead of print September 2019).

Heavy metal exposures may contribute to diabetes risk but prospective studies are uncommon. We analyzed the Australian Longitudinal Study on Women's Health (three cohorts aged 18-23, 45-50, or 70-75 at baseline in 1996, N = 34,191) merged with emissions data for 10 heavy metals (As, Be, Co, Cr, Cu, Hg, Mn, Ni, Pb, Zn) from the National Pollutant Inventory. Over 20-year follow-up, 2,584 women (7.6%) reported incident diabetes. Cox proportional hazards regression models showed that women aged 45-50 at baseline had higher diabetes risk in association with exposure to total air emissions, total water emissions, all individual metals air emissions, and six individual water emissions. After correction for false discovery rate, nine of 11 air emissions and five water emissions remained significant. Associations were not observed for land-based emissions, or for younger or older cohorts. Emissions were dominated by mining, electricity generation and other metals-related industrial processes.

Hendryx M, Chojenta C, Luo J, Byles J. **Obesity risk among young Australian women: A prospective latent class analysis.** *Obesity*, 2020, 28(1); 154-160. <https://doi.org/10.1002/oby.22646> (first published 22 November 2019).

Objective: Prospective studies on obesity incidence specifically among young adults have not been reported. This study examined risks of obesity incidence over 19 years among young women without obesity at baseline.

Methods: Women aged 18 to 23 years at baseline (N = 8,177) were followed up every 2 to 3 years to ages 37 to 42 using the Australian Longitudinal Study on Women's Health. A latent class analysis identified obesity-risk classes based on time-dependent measures of income, education, physical activity, sleep quality, dietary behavior, depression, stressful events, and social functioning. Cox proportional hazards regression models examined associations between incident obesity and latent classes, controlling for covariates.

Results: Four latent classes were identified, including a lower-risk referent class and classes characterized by poor exercise and diet, stress and low income, and multiple intermediate-level risks. Compared with the referent, all three risk classes had significantly higher obesity risk, with the highest risk in the stress and low-income group (hazard ratio = 2.22; 95% CI: 1.92-2.56). Individual risks associated with obesity included lower education, stressful life events, and lower vigorous physical activity.

Conclusions: Young women without baseline obesity were at risk of developing obesity when they experienced co-occurring behavioral, socioeconomic, and psychosocial risks. Both latent classes and individual risk indicators offer insights into prevention strategies.

Hofer MK, Collins HK, Mishra GD & Schaller M. **Do post-menopausal women provide more care to their kin?: Evidence of grandparental caregiving from two large-scale national surveys.** *Evolution and Human Behavior*, 2019, 40; 355-364.

Drawing on the logical principles of life-history theory, it may be hypothesized that—compared to pre-menopausal women—post-menopausal women will spend more time caring for grandchildren and other kin. This hypothesis was tested in two studies, on results obtained from two large datasets documenting altruistic behaviors of pre-menopausal and post-menopausal women in the United States (N = 7, 161) and Australia (N = 25, 066). Results from both studies revealed that (even when controlling statistically for age, health, financial resources, and other pertinent variables), post-menopausal women devoted more time to grandparental caregiving. This effect was specific to kin care: Menopause status was not as strongly related to a measure of non-kin-directed altruistic behavior (time spent volunteering). These results provide the first empirical support for a previously-untested behavioral implication of menopause.

Holden L, Harris M, Hockey R, Ferrari A, Lee YY, Dobson AJ & Lee C. **Predictors of change in depressive symptoms over time: Results from the Australian Longitudinal Study on Women's Health.** *Journal of Affective Disorders*, 2019, 245; 771-778.

Background: Depressive symptoms fluctuate over time, and are most common amongst women in early adulthood. Understanding predictors of changes in depressive symptoms among young women may inform health promotion and early intervention.

Methods: Data were collected at three-yearly intervals from 2000 (Survey 2) to 2012 (Survey 6) from the Australian Longitudinal Study on Women's Health. The sample comprised 7663 women, aged 22–27 in 2000, who reported any indicator of poor mental health at any wave. Generalised linear mixed models identified predictors of change in depressive symptoms (CESD-10) over each three-year period.

Results: Depressive symptoms reduced over time. In a fully adjusted model, greater reduction in symptoms was predicted by higher initial symptoms, time, higher social support, and higher self-rated general health. Slower reduction was predicted by lower education, difficulty managing on income, high or zero alcohol consumption, stress, and history of childhood sexual assault or partner violence. Motherhood predicted an increase in depressive symptoms at Survey

2 (2000), but a decrease at Survey 5 (2009). Limitations: Although sampling was nationally representative, there is a slight bias towards Australian-born and more educated women. Further, although validated measures are used, all data are self-report.

Conclusions: Fluctuations in depressive symptoms among young women are related to fixed and time-varying factors spanning multiple health and social domains. A range of factors, including education

and financial resources, promotion of positive social support systems, and encouragement of health promoting lifestyles, might serve to promote young women's mental health and thus to reduce pressure on clinical services.

Holton S, Fisher J, Nguyen H, Brown WJ & Tran T. **Pre-pregnancy body mass index and the risk of antenatal depression and anxiety.** *Women and Birth*, 2019, 32(6); e508-e514.

Background: While the physical health risks of obesity during pregnancy for women are well understood, little is known about the mental health implications. The aim of this study was to investigate the relationship between pre-pregnancy body mass index (BMI) and symptoms of antenatal depression and anxiety.

Methods: Secondary analysis of cross-sectional data contributed by the younger cohort (born 1973–78) of the Australian Longitudinal Study of Women's Health who were pregnant at the time of the survey (Waves 4–6: aged 28–39 years). Primary outcomes were symptoms of depression (Center for Epidemiologic Studies Depression Scale 10 score \geq 10) and anxiety (Goldberg Anxiety Scale score \geq 6). BMI was assessed using self-reported pre-pregnancy weight and height. Demographic characteristics, psychosocial factors, health behaviors and reproductive history were assessed using study-specific and standardized measures. Multivariable regression models were used to examine the associations between predictors and outcome scores.

Results: The mean pre-pregnancy BMI of the 1621 women included in the analysis was 24.9 kg/m²; more than a third (39.8%) were overweight or obese. More than one in ten (15.4%) had depressive symptoms, and a quarter (25.0%) had anxiety symptoms. Higher pre-pregnancy BMI and certain sociodemographic characteristics including not having a paid job were significantly related to higher antenatal depression and anxiety scores.

Conclusions: High pre-pregnancy BMI is significantly associated with an increased risk of antenatal depression and anxiety. Consistent with clinical practice guidelines, women with high pre-pregnancy BMI should be screened and assessed for depression and anxiety, and where appropriate provided with clinical referral pathways and support.

Jackson JK, MacDonald-Wicks LK, McEvoy MA, Forder PM, Holder C, Oldmeadow C, Byles JE & Patterson AJ. **Better diet quality scores are associated with a lower risk of hypertension and non-fatal CVD in middle-aged Australian women over 15 years of follow-up.** *Public Health Nutrition*, 2019. <https://doi.org/10.1017/S1368980019002842> (Published online October 2019).

Objective: To explore if better diet quality scores as a measure of adherence to the Australian Dietary Guidelines (ADG) and the Mediterranean diet (MedDiet) are associated with a lower incidence of hypertension and non-fatal CVD.

Design: Prospective analysis of the 1946–1951 cohort of the Australian Longitudinal Study on Women's Health (ALSWH). The Australian Recommended Foods Score (ARFS) was calculated as an indicator of adherence to the ADG; the Mediterranean Diet Score (MDS) measured adherence to the MedDiet.

Outcomes included hypertension and non-fatal CVD. Generalised estimating equations estimated OR and 95 % CI across quartiles of diet quality scores.

Setting: Australia, 2001–2016.

Participants: 1946–1951 cohort of the ALSWH (n 5324), without CVD, hypertension and diabetes at baseline (2001), with complete Food Frequency Questionnaire data.

Results: There were 1342 new cases of hypertension and 629 new cases of non-fatal CVD over 15 years of follow-up. Multivariate analysis indicated that women reporting better adherence to the ARFS ($\geq 38/74$) had 15 % (95 % CI 1, 28 %; $P = 0.05$) lower odds of hypertension and 46 % (95 % CI 6, 66 %; $P = 0.1$) lower odds of non-fatal CVD. Women reporting better adherence to the MDS ($\geq 8/17$) had 27 % (95 % CI 15, 47 %; $P = 0.0006$) lower odds of hypertension and 30 % (95 % CI 2, 50 %; $P = 0.03$) lower odds of non-fatal CVD.

Conclusions: Better adherence to diet quality scores is associated with lower risk of hypertension and non-fatal CVD. These results support the need for updated evidenced based on the ADG as well as public health nutrition policies in Australia.

Jackson JK, Patterson AJ, MacDonald-Wicks LK, Forder PM, Blekkenhorst LC, Bondonno CP, Hodgson JM, Ward NC, Holder C, Oldmeadow C, Byles JE & McEvoy MA. **Vegetable nitrate intakes are associated with reduced self-reported cardiovascular-related complications within a representative sample of middle-aged Australian women, prospectively followed up for 15 years.** *Nutrients*, 2019, 11(2); 240.

Nitric oxide (NO) facilitates anti-atherosclerotic effects. Vegetables are a major source of dietary nitrate. Experimental data indicates that dietary nitrate can significantly reduce major risk factors for atherosclerosis and subsequent cardiovascular disease (CVD), as nitrate can be metabolized to produce NO via the nitrate-nitrite-NO pathway. The purpose of this study was to prospectively investigate the association between habitual dietary nitrate intakes and the incidence of self-reported CVD-related complications within a representative sample of middle-aged Australian women (1946–1951 cohort of the Australian Longitudinal Study on Women's Health). Women free from disease at baseline who had completed the food frequency questionnaire data were included. Generalized estimating equations were used to estimate odds ratios (OR) and 95% confidence intervals (95% CI) across quartiles for nitrate intakes. Of the 5324 women included for analysis, there were 1951 new cases of CVD-related complications over 15-years of follow-up. Women reporting higher total dietary nitrate intakes (Q4 > 78.2 mg/day) and vegetable nitrate intakes (Q4 > 64.4 mg/day) were 25% and 27% reduced risk of developing CVD-related complications respectively, compared with women reporting low total (Q1 < 45.5 mg/day) and vegetable nitrate intakes (Q1 < 34.8 mg/day). Our findings were consistent with other observational data indicating that dietary nitrate may explain some of the cardiovascular benefits of vegetable consumption.

Kakoly NS, Earnest A, Teede HJ, Moran LJ and Joham AE. **The impact of obesity on the incidence of type 2 diabetes among women with Polycystic Ovary Syndrome.** *Diabetes Care*, 2019, 42(4);

Objective: The nature of the independent relationship between polycystic ovary syndrome (PCOS) and type 2 diabetes remains unclear. Few studies have aimed to clarify this relationship independent of obesity in longitudinal population-based cohorts.

Research design and methods: We used the Australian Longitudinal Study on Women's Health (ALSWH) (2000–2015) database to estimate nationwide incidence rates and predictors of type 2 diabetes among women aged 18–42 using person-time and survival analysis.

Results: Over a follow-up of 1,919 person-years (PYs), 186 women developed type 2 diabetes. The incidence rate was 4.19/1,000 PYs and 1.02/1,000 PYs ($P < 0.001$) in PCOS and control subjects. On subgroup analyses across healthy-weight, overweight, and obese categories of women, the incidence rates for type 2 diabetes were 3.21, 4.67, and 8.80, whereas incidence rate ratios were 4.68, 3.52, and 2.36 ($P < 0.005$) in PCOS versus age-matched control subjects. PCOS was one of the most influential predictors for type 2 diabetes in the entire cohort (hazard ratio 3.23, 95% CI 2.07–5.05, $P < 0.001$) adjusting for BMI, education, area of residence, and family history of type 2 diabetes.

Conclusions: Women with PCOS are at an increased risk of type 2 diabetes, irrespective of age and BMI. The incidence of type 2 diabetes increases substantially with increasing obesity; yet, PCOS adds a greater relative risk in lean women. Based on the overall moderate absolute clinical risk demonstrated here, guideline recommendations suggest type 2 diabetes screening every 1–3 years in all women with PCOS, across BMI categories and age ranges, with frequency influenced by additional type 2 diabetes risk factors.

Laaksonen MA, MacInnis R, Canfell K, Giles GG, Hull P, Shaw JE, Cumming RG, Gill TK, Banks E, Mitchell P, Byles JE, Magliano DJ, Hirani V, Connah D & Vajdic CM. **The future burden of kidney and bladder cancers preventable by behaviour modification in Australia: A pooled cohort study.** *International Journal of Cancer*, 2020, 146(3); 874-883. <https://doi.org/10.1002/ijc.32420> (First published online May 2019).

Substantial changes in the prevalence of the principal kidney and bladder cancer risk factors, smoking (both cancers) and body fatness (kidney cancer), have occurred but the contemporary cancer burden attributable to these factors has not been evaluated. We quantified the kidney and bladder cancer burden attributable to individual and joint exposures and assessed whether these burdens differ between population subgroups. We linked pooled data from seven Australian cohorts ($N = 367,058$) to national cancer and death registries and estimated the strength of the associations between exposures and cancer using adjusted proportional hazards models. We estimated exposure prevalence from representative contemporaneous health surveys. We combined these estimates to calculate population attributable fractions (PAFs) with 95% confidence intervals (CIs), accounting for competing risk of death, and compared PAFs for population subgroups. During the first 10-year follow-up, 550 kidney and 530 bladder cancers were diagnosed and over 21,000 people died from any cause. Current levels of overweight and obesity explain 28.8% (CI = 17.3-38.7%), current or past smoking 15.5% (CI = 6.0-

24.1%) and these exposures jointly 39.6% (CI = 27.5-49.7%) of the kidney cancer burden. Current or past smoking explains 44.4% (CI = 35.4-52.1%) of the bladder cancer burden, with 24.4% attributable to current smoking. Ever smoking explains more than half (53.4%) of the bladder cancer burden in men, and the burden potentially preventable by quitting smoking is highest in men (30.4%), those aged <65 years (28.0%) and those consuming >2 standard alcoholic drinks/day (41.2%). In conclusion, large fractions of kidney and bladder cancers in Australia are preventable by behavior change.

Laaksonen MA, Arriaga ME, Canfell K, MacInnis RJ, Byles JE, Banks E, Shaw JE, Mitchell P, Giles GG, Magliano DJ, Gill TK, Klaes E, Velentzis LS, Hirani V, Cumming RG & Vajdic CM. **The preventable burden of endometrial and ovarian cancers in Australia: A pooled cohort study.** *Gynecological Oncology*, 2019, 153(3); 580-588.

Objective: Evidence on the endometrial and ovarian cancer burden preventable through modifications to current causal behavioural and hormonal exposures is limited. Whether the burden differs by population subgroup is unknown.

Methods: We linked pooled data from six Australian cohort studies to national cancer and death registries, and quantified exposure-cancer associations using adjusted proportional hazards models. We estimated exposure prevalence from representative health surveys. We then calculated Population Attributable Fractions (PAFs) with 95% confidence intervals (CIs), accounting for competing risk of death, and compared PAFs for population subgroups.

Results: During a median 4.9 years follow-up, 510 incident endometrial and 303 ovarian cancers were diagnosed. Overweight and obesity explained 41.9% (95% CI 32.3–50.1) of the endometrial cancer burden and obesity alone 34.5% (95% CI 27.5–40.9). This translates to 12,800 and 10,500 endometrial cancers in Australia in the next 10 years, respectively. The body fatness-related endometrial cancer burden was highest (49–87%) among women with diabetes, living remotely, of older age, lower socio-economic status or educational attainment and born in Australia. Never use of oral contraceptives (OCs) explained 8.1% (95% CI 1.8–14.1) or 2500 endometrial cancers. A higher BMI and current long-term MHT use increased, and long-term OC use decreased, the risk of ovarian cancer, but the burden attributable to overweight, obesity or exogenous hormonal factors was not statistically significant.

Conclusions: Excess body fatness, a trait that is of high and increasing prevalence globally, is responsible for a large proportion of the endometrial cancer burden, indicating the need for effective strategies to reduce adiposity.

Looman M, Schoenaker D, Soedamah-Muthu SS, Mishra GD, Geelen A, & Feskens EJM. **Pre-pregnancy dietary micronutrient adequacy is associated with lower risk of developing gestational diabetes in Australian women.** *Nutrition Research*, 2019, 62; 32-40.

Evidence on pre-pregnancy dietary micronutrient intake in relation to gestational diabetes (GDM) development is limited. Therefore, we examined the prevalence of inadequate micronutrient intake before pregnancy and the association between pre-pregnancy dietary micronutrient adequacy, i.e.

meeting micronutrient intake recommendations for a range of micronutrients, and risk of developing GDM in an Australian population. We hypothesized that women with an overall higher micronutrient adequacy would have a lower risk of developing GDM. We used data from the prospective Australian Longitudinal Study on Women's Health cohort, in which 3607 women, aged 25–30 years at baseline in 2003 and without diabetes, were followed-up until 2015. Diet was assessed with a validated 101-item food frequency questionnaire. The Micronutrient Adequacy Ratio (MAR) was calculated as the micronutrient intake divided by its recommended dietary intake averaged over 13 micronutrients. Multivariable regression models with generalized estimating equations were used to estimate relative risks (RR) and 95% confidence intervals (95% CI). In 6263 pregnancies, 285 cases of GDM were documented (4.6%). High prevalences of inadequate dietary micronutrient intake were observed for calcium (47.9%), folate (80.8%), magnesium (52.5%), potassium (63.8%) and vitamin E (78.6%), indicating suboptimal pre-pregnancy micronutrient intakes. Inadequate intakes of individual micronutrients were not associated with risk of developing GDM. However, women in the highest quartile of the MAR had a 39% lower risk of developing GDM compared to women in the lowest quartile (RR 0.61, 95% CI 0.43–0.86, *p* for trend 0.01). These results highlight the importance of adequate pre-pregnancy micronutrient intake.

Loxton D, Harris ML, Forder P, Powers J, Townsend N, Byles J, & Mishra G. **Factors influencing web-based survey response for a longitudinal cohort of young women born between 1989 and 1995.** *Journal of Medical Internet Research*, 2019, 21(3); e11286.

Background: With health research practices shifting toward rapid recruitment of samples through the use of online approaches, little is known about the impact of these recruitment methods on continued participation in cohort studies.

Objective: This study aimed to report on the retention of a cohort of young women who were recruited using an open recruitment strategy.

Methods: Women from the 1989-95 cohort of the Australian Longitudinal Study on Women's Health, recruited in 2012 and 2013 were followed up annually via Web-based surveys in 2014, 2015, and 2016. Prevalence ratios for survey response were calculated using log-binomial models with generalized estimating equations including demographic, health-related, and recruitment method characteristics examined as explanatory factors.

Results: Of the 17,012 women who completed the baseline survey (Survey 1) in 2012 to 2013, approximately two-thirds completed Survey 2 (2014), and just over half completed Surveys 3 (2015) and 4 (2016). Women demonstrated transient patterns of responding with 38.21% (6501/17,012) of women completing all 4 surveys. Although retention of young women was associated with older age, higher education, higher self-rated health status, and low engagement with adverse health behaviors, the method of recruitment was a key determinant of study participation in the multivariate model. Although women were more likely to be recruited into the cohort via social media (eg, Facebook), retention over time was higher for women recruited through traditional media and referral approaches.

Conclusions: A balance must be obtained between achieving representativeness, achieving rapid cohort recruitment, and mitigating the pitfalls of attrition based on recruitment method in the new era of cohort studies, where traditional recruitment methods are no longer exclusively viable options.

Loxton D, Powers J, Townsend N, Harris ML & Forder P. **Longitudinal inconsistency in responses to survey items that ask women about intimate partner violence.** *BMC Medical Research Methodology*, 2019, 19(1); 201.

Background: Longitudinal research has demonstrated that experiences of abuse and adversity are not consistently reported over time; however, there is a paucity of available evidence regarding the consistency of reporting experiences of intimate partner violence (IPV) over time. This study aimed to investigate the consistency of self-reported IPV involving a partner or spouse. Differences in the health status of women according to consistency of IPV reporting was also investigated.

Methods: Survey data collected from the 1946–51 cohort of the Australian Longitudinal Study on Women's Health (ALSWH) between 1996 and 2016 were used (n = 13,715). Consistency of self-reported IPV was evaluated by responses to the question "Have you ever been in a violent relationship with a partner/spouse?" Demographic and health characteristics of consistent and inconsistent reporters of IPV were compared. Multinomial logistic regression was used to determine the strength of the association between demographic and health characteristics of the women and their consistency of longitudinal reporting of IPV.

Results: There were 10,966 women who answered IPV questions over six surveys, with 9610 women (87.6%) providing consistent responses. Inconsistent responses were provided by 1356 women (12.4%), of whom 258 (2.4%) reported IPV at all but one survey (Mainly IPV), 587 (5.3%) reported no IPV at all but one survey (Mainly no IPV), and 511 (4.7%) reported Mixed IPV responses over time. Women in the Mainly IPV group, and those in the Mixed IPV group were similar to those in the Consistent IPV group in demographic and health characteristics, whereas women in the Mainly no IPV group were similar to those in the Consistent never IPV group.

Conclusions: IPV data collected at one time point may involve around 12% false negative or false positive responses. To increase reliability, IPV should be measured on more than one occasion, using different techniques and methods that account for intentional and unintentional over- and under-reporting.

Loxton D, Townsend N, Dolja-Gore X, Forder P, Coles J. **Adverse Childhood Experiences and healthcare costs in adult life.** *Journal of Child Sexual Abuse*, 2019, 8(5); 511-525.

The current study aims to present the prevalence of adverse childhood experiences and examine the healthcare costs associated with primary, allied, and specialist healthcare services. The Australian Longitudinal Study on Women's Health is a general health survey of four nationally representative age cohorts. The current study uses 20 years of survey and administrative data (1996-2015) from the cohort born 1973-1978. Overall, 41% of women indicated at least one category of childhood adversity. The

most commonly reported type of childhood adversity was having a household member with a mental illness (16%), with the most commonly reported ACES category being psychological abuse (17%). Women who had experienced adversity in childhood had higher healthcare costs than women who had not experienced adversity. The healthcare costs associated with experiences of adversity in childhood fully justify a comprehensive policy and practice review.

Majeed T, Tavener M, Dolja-Gore X, Nair B, Chojenta C & Byles J. **Patterns of geriatric health assessment use among community dwelling older Australian women over a 14-year period.** *Journal of Health Services Research and Policy*, 2019, 24(2); 100-107.

No abstract available.

Melka A, Chojenta C, Holliday E & Loxton D. **Adverse childhood experiences and electronic cigarette use among young Australian women.** *Preventive Medicine*, 2019, 126; 105759.

Researchers have identified positive relationships between childhood adversities and smoking, problem drinking and illicit drug abuse. Nonetheless, to our knowledge, in no studies has there been an examination of the association between adverse childhood experiences (ACEs) and e-cigarette use. This study aimed to investigate the association between ACEs and e-cigarette use. Data from the Australian Longitudinal Study on Women's Health were used.

Study respondents (N = 8915) from the 1989–95 cohort (third wave) aged 19–26 years completed an online survey in 2015. Multivariate logistic regression analysis was used to examine the association between ACEs and e-cigarette use, adjusted for socio-demographic variables and smoking status.

Participants who reported past year e-cigarette use were more likely to report childhood psychological abuse (Adjusted odds ratio (AOR) = 1.45, 99%CI: 1.11, 1.90), physical abuse (AOR = 1.30, 99%CI, 1.03, 1.82), or sexual abuse (AOR = 1.41, 99%CI, 1.02, 1.95). All abuse types associated with past year e-cigarette use were also associated with ever e-cigarette use. Ever e-cigarette use was also associated with household substance abuse (AOR = 1.35, 99%CI, 1.08, 1.68), witnessing domestic violence (AOR = 1.28, 99%CI, 1.01, 1.69), or having a mentally ill household member (AOR = 1.28, 99%CI, 1.05, 1.58) compared with those who were not. A positive dose-response relationship was observed between the number of ACEs and the odds of e-cigarette use.

This study identified an association between ACEs and e-cigarette use. Improvements in supportive parenting skills and the provision of counselling services for those exposed to ACEs may help avert health-harming behaviours, including e-cigarette use.

Melka AS, Chojenta CL, Holliday EG & Loxton DJ. **Predictors of e-cigarette use among young Australian women.** *American Journal of Preventive Medicine*, 2019, 56(2); 293-299.

Introduction: E-cigarette use is controversial worldwide. The majority of previous studies on e-cigarette use were not gender specific. This study aimed to identify the predictors of e-cigarette use among young

Australian women.

Methods: This study used cross-sectional data from the 1989–1995 cohort of the Australian Longitudinal Study on Women's Health. In 2015, study participants (N=8,915) aged 19–26 years completed an online survey. Multivariable logistic regression was used to identify predictors of e-cigarette use. Data were analyzed in 2018.

Results: The prevalence of ever and past-year e-cigarette use among young Australian women was 11.1% and 6.4%, respectively. More than a quarter of past-year and ever e-cigarette users were never cigarette smokers. Use of e-cigarettes in the past year was associated with younger age (AOR per year increase=0.87, 95% CI=0.82, 0.93); financial difficulty (AOR=0.68, 95% CI=0.54, 0.87); being an ex-smoker (AOR=5.05, 95% CI=3.64, 7.01) or current cigarette smoker (AOR=10.01, 95% CI=7.77, 12.89); drinking at a level of lifetime risk of harm from alcohol-related disease or injury (AOR=1.23, 95% CI=1.01, 1.53). Ever e-cigarette use showed similar associations and was also associated with rural residence (AOR=0.74, 95% CI=0.60, 0.91) and intimate partner violence (AOR=1.44, 95% CI=1.17, 1.76).

Conclusions: The high prevalence of e-cigarette use among never cigarette smokers has significant public health implications. Interventions to curb the use of e-cigarettes among young Australian women should focus on risk factors, such as early age, cigarette smoking, alcohol use, and intimate partner violence.

Mishra GD, Chung HF, Pandeya N, Kuh D, Hayashi K, Lee JS, Mizunuma H, Crawford SL, Avis NE, Gold EB, Mitchell ES, Woods NF, Anderson D, Brown DE, Sievert LL, Brunner EJ, Demakakos P, Cade JE, Greenwood DC, Giles GG, Bruinsma F, Cooper R, Hardy R, Tillin T, Obermeyer CM, Simonsen MK, Canonico M, Ancelin ML, Schoenaker DAJM, Adami HO, Weiderpass E & Dobson AJ. **Variations in reproductive events across life: A pooled analysis of data from 505,147 women across ten countries.** *Human Reproduction*, 2019, 34(5); 881–893.

Study question: How has the timing of women's reproductive events (including ages at menarche, first birth, and natural menopause, and the number of children) changed across birth years, racial/ethnic groups and educational levels?

Summary answer: Women who were born in recent generations (1970-84 vs before 1930) or those with higher education levels had menarche a year earlier, experienced a higher prevalence of nulliparity and had their first child at a later age.

What is known already: The timing of key reproductive events, such as menarche and menopause, is not only indicative of current health status but is linked to the risk of adverse hormone-related health outcomes in later life. Variations of reproductive indices across different birth years, race/ethnicity and socioeconomic positions have not been described comprehensively.

Study design, size, duration: Individual-level data from 23 observational studies that contributed to the International Collaboration for a Life Course Approach to Reproductive Health and Chronic Disease Events (InterLACE) consortium were included.

Participant/materials, setting, methods: Altogether 505 147 women were included. Overall estimates

for reproductive indices were obtained using a two-stage process: individual-level data from each study were analysed separately using generalised linear models. These estimates were then combined using random-effects meta-analyses.

Main results and the role of chance: Mean ages were 12.9 years at menarche, 25.7 years at first birth, and 50.5 years at natural menopause, with significant between-study heterogeneity ($I^2 > 99\%$). A linear trend was observed across birth year for mean age at menarche, with women born from 1970 to 1984 having menarche one year earlier (12.6 years) than women born before 1930 (13.5 years) (P for trend = 0.0014). The prevalence of nulliparity rose progressively from 14% of women born from 1940-49 to 22% of women born 1970-84 ($P = 0.003$); similarly, the mean age at first birth rose from 24.8 to 27.3 years ($P = 0.0016$). Women with higher education levels had fewer children, later first birth, and later menopause than women with lower education levels. After adjusting for birth year and education level, substantial variation was present for all reproductive events across racial/ethnic/regional groups (all P values < 0.005).

Limitations, reasons for caution: Variations of study design, data collection methods, and sample selection across studies, as well as retrospectively reported age at menarche, age at first birth may cause some bias.

Wider implications of the findings: This global consortium study found robust evidence on variations in reproductive indices for women born in the 20th century that appear to have both biological and social origins.

Study Funding/competing interest(s): InterLACE project is funded by the Australian National Health and Medical Research Council project grant (APP1027196). GDM is supported by the Australian National Health and Medical Research Council Principal Research Fellowship (APP1121844).

Mo L, Teede HJ, Joham AE, Cain SW, Bennett C, Blumfield M, Loxton D, Mansfield DR, Moran LJ. **Sleep disturbances in women with and without polycystic ovary syndrome in an Australian National Cohort.** *Clinical Endocrinology*, 2019, 90(4); 570-578.

Background: Polycystic ovary syndrome (PCOS) is a common condition in reproductive-aged women. Sleep disturbances may be more prevalent in PCOS. It is not known if this relationship is independent of other factors.

Aim: To examine the prevalence of sleep disturbances in a large community based cohort study in women with and without PCOS and its relationship to clinical, demographic and comorbid factors.

Methods: We examined data from survey 5 (2009) of the Australian Longitudinal Study on Women's Health ($n=6578$, $n=484$ PCOS and $n=6094$ non-PCOS). Sleep duration and disturbances were self-reported. Three classes of sleep pattern were derived during latent class analysis (normal sleep duration with average sleep, normal sleep duration with sleep symptoms and short sleep duration with sleep symptoms) and compared between women with and without PCOS using multivariate regression, adjusting for body mass index (BMI), depressive symptoms, demographic and comorbid factors.

Results: Women with PCOS had similar sleep duration but were more likely to experience difficulty

sleeping often (RRR 1.67, 1.20-2.33, P=0.003) and sometimes (RRR 1.39, 1.07-1.80, P=0.015), with restless sleep reported occasionally (RRR, 1.35 1.00-1.83, P=0.049). They reported severe tiredness often (RRR 1.48, 95% CI 1.08-2.04, P=0.016), and described more sleep difficulties within the last 12 months (OR 1.29, 1.04-1.60, P=0.018) on adjusted analyses. Compared to the class of average sleep duration with no sleep disturbances, PCOS was associated with increased relative risk of having average sleep duration with sleep symptoms (RRR 1.40, 95%CI 1.11-1.77, P=0.004) and short sleep duration with sleep symptoms (RRR 1.46, 95%CI 1.07-1.99, P=0.016) on adjusted analyses.

Conclusion: Sleep disturbances are more prevalent amongst women with PCOS after adjusting for BMI, depressive symptoms, demographic and comorbid factors. Targeted screening and management of sleep disturbances is warranted in PCOS.

Moss KM, Loxton D, Dobson AJ, Slaughter V & Mishra GD. **Testing competing mediators of the association between pre-conception maternal depression and child health-related quality of life: the MatCH study.** *Archives of Women's Mental Health*, 2020; 53-62. <https://doi.org/10.1007/s00737-019-0941-7> (First published online January 2019).

Maternal depression is a potent risk factor for poor child development across a number of domains but the mechanisms of transmission are poorly understood. This study aimed to test competing mediators of the association between pre-conception maternal depression and child psychosocial functioning. In 2016, mothers in the 1973-1978 cohort of the Australian Longitudinal Study on Women's Health were asked to be part of the Mothers and their Children's Health study and to complete surveys on the health of their three youngest children under 13 years. The current study includes children aged 0-12 years (N = 5532, M = 6.99 years, SD = 3.22 years) and their mothers (N = 2917). We used the CESD-10 to measure depression and the PedsQL to measure psychosocial functioning, and used multilevel structural equation modeling to test hypotheses. Pre-conception maternal depression was associated with poorer maternal mental health and parenting after birth. The effect of pre-conception maternal depression was mediated by post-birth maternal depression in children aged 0-4 years (unstandardized regression coefficient (B) = - 0.26, 95%CI - 0.38, - 0.13) and children aged 5-12 years (B = - 0.25, 95%CI - 0.34, - 0.16), and by post-birth maternal stress (B = - 0.04, 95%CI - 0.08, - 0.01), and parenting (B = - 0.03, 95%CI - 0.04, - 0.02) in children aged 5-12 years. Post-birth maternal depression was the strongest mediator. Pre-conception is the optimal time for depression intervention. Post-birth interventions should include a focus on reducing depression and improving negative parenting aspects such as hostility and discipline.

Nicolaou M, Colpo M, Vermeulen E, Elstgeest EM, Cabout M, Gibson-Smith D, Knuppel A, Sini G, Schoenaker DAJM, Mishra G, Anja L, Penninx BWJH, Bandinelli S, Brunner EJ, Zwiderman AH, Brouwer IA & Visser M. **Association of a priori dietary patterns with depressive symptoms: a harmonized meta-analysis of observational studies.** *Psychological Medicine*, 2019. <https://doi.org/10.1017/S0033291719001958> (Published online August 2019).

Background: Review findings on the role of dietary patterns in preventing depression are inconsistent,

possibly due to variation in assessment of dietary exposure and depression. We studied the association between dietary patterns and depressive symptoms in six population-based cohorts and meta-analysed the findings using a standardised approach that defined dietary exposure, depression assessment and covariates.

Methods: Included were cross-sectional data from 23 026 participants in six cohorts: InCHIANTI (Italy), LASA, NESDA, HELIUS (the Netherlands), ALSWH (Australia) and Whitehall II (UK). Analysis of incidence was based on three cohorts with repeated measures of depressive symptoms at 5–6 years of follow-up in 10 721 participants: Whitehall II, InCHIANTI, ALSWH. Three a priori dietary patterns, Mediterranean diet score (MDS), Alternative Healthy Eating Index (AHEI-2010), and the Dietary Approaches to Stop Hypertension (DASH) diet were investigated in relation to depressive symptoms. Analyses at the cohort-level adjusted for a fixed set of confounders, meta-analysis used a random-effects model.

Results: Cross-sectional and prospective analyses showed statistically significant inverse associations of the three dietary patterns with depressive symptoms (continuous and dichotomous). In cross-sectional analysis, the association of diet with depressive symptoms using a cut-off yielded an adjusted OR of 0.87 (95% confidence interval 0.84–0.91) for MDS, 0.93 (0.88–0.98) for AHEI-2010, and 0.94 (0.87–1.01) for DASH. Similar associations were observed prospectively: 0.88 (0.80–0.96) for MDS; 0.95 (0.84–1.06) for AHEI-2010; 0.90 (0.84–0.97) for DASH.

Conclusion: Population-scale observational evidence indicates that adults following a healthy dietary pattern have fewer depressive symptoms and lower risk of developing depressive symptoms.

Pavey T & Brown WJ. **Sitting time and depression in young women over 12-years: The effect of physical activity.** *Journal of Science and Medicine in Sport*, 2019, 22(10); 1125-1131.

Objectives: Lack of physical activity (PA) and prolonged sitting time (ST) are associated with increased risk of mortality and chronic illnesses, including depression. While there have been claims that the two risks are 'independent', their joint and stratified effects are unclear. The aim of this study was to explore the combined effects of physical activity and sitting time on the 12 year risk of depressive symptoms (DS) in young women.

Design: Cohort-9061 young participants in the Australian Longitudinal Study on Women's Health completed triennial surveys from 2000 (age 22–27), to 2012.

Methods: Generalised Estimating Equation models were used to calculate the joint effects of PA and ST on DS, with <4 h/day of ST and the highest PA quartile as the reference categories. Relationships between PA and DS, and between ST and DS, were also examined after stratification by ST and PA respectively.

Results: In the adjusted joint effects model, compared with the reference category (low sitting, high PA), odds for DS were significantly higher in women who sat for >4, 6 and 8 h/day and reported doing no PA. In every physical activity category, women who sat for ≥10 h/day were at highest risk of DS (OR for lowest physical activity quartile, 1.72 [95% CI = 1.38–2.14]; OR for highest physical activity quartile,

1.49 [95% CI = 1.16–1.91]). After stratification by ST, odds of DS were reduced in women who reported any physical activity (compared with none), except when ST was >10 h/day. After stratification by physical activity, the increased risk of sitting 8–10 h/day was attenuated by any physical activity, but there was no reduction in risk of depressive symptoms with increasing PA levels in women who sat for ≥10 h per day.

Conclusions: These data suggest that there are both joint and stratified effects of too little activity and too much sitting on the risk of depressive symptoms in young women. High levels of PA are protective against the hazards of high ST at this life stage, except in women with very high levels of sitting.

Peeters G, Cooper R, Tooth L, van Schoor NM & Kenny RA. **A comprehensive assessment of risk factors for falls in middle-aged adults: co-ordinated analyses of cohort studies in four countries.** *Osteoporosis International*, 2019, 30; 2099-2117. <https://doi.org/10.1007/s00198-019-05034-2>

Summary: We identified demographic, health and lifestyle factors associated with falls in adults aged 50–64 years from Australia, The Netherlands, Great Britain and Ireland. Nearly all factors were associated with falls, but there were differences between countries and between men and women. Existing falls prevention programs may also benefit middle-aged adults.

Introduction: Between ages 40–44 and 60–64 years, the annual prevalence of falls triples suggesting that middle age may be a critical life stage for preventive interventions. We aimed to identify demographic, health and lifestyle factors associated with falls in adults aged 50–64 years.

Methods: Harmonised data were used from four population-based cohort studies based in Australia (Australian Longitudinal Study on Women's Health, n = 10,641, 51–58 years in 2004), Ireland (The Irish Longitudinal Study on Ageing, n = 4663, 40–64 years in 2010), the Netherlands (Longitudinal Ageing Study Amsterdam, n = 862, 55–64 years in 2012–13) and Great Britain (MRC National Survey of Health and Development, n = 2987, 53 years in 1999). Cross-sectional and prospective associations of 42 potential risk factors with self-reported falls in the past year were examined separately by cohort and gender using logistic regression. In the absence of differences between cohorts, estimates were pooled using meta-analysis.

Results: In cross-sectional models, nearly all risk factors were associated with fall risk in at least one cohort. Poor mobility (pooled OR = 1.71, CI = 1.34–2.07) and urinary incontinence (OR range = 1.53–2.09) were consistently associated with falls in all cohorts. Findings from prospective models were consistent. Statistically significant interactions with cohort and sex were found for some of the risk factors.

Conclusion: Risk factors known to be associated with falls in older adults were also associated with falls in middle age. Compared with findings from previous studies of older adults, there is a suggestion that specific risk factors, for example musculoskeletal conditions, may be more important in middle age. These findings suggest that available preventive interventions for falls in older adults may also benefit middle-aged adults, but tailoring by age, sex and country is required.

Peeters G, Beard JR, Deeg DJH, Tooth LR, Brown WJ & Dobson AJ. **Longitudinal associations between lifestyle, socio-economic position and physical functioning in women at different life stages.** *European Journal of Ageing*, 2019, 16(2); 167-179.

Women's physical functioning declines with age and the rate of decline increases with age, but substantial disparities exist in trajectories over time. To inform development of interventions to optimise physical functioning across the adult life span, the aim is to explore which lifestyle and socio-economic position (SEP) factors contribute to disparities in physical functioning across the adult life span in women. Younger (born 1973–1978, n = 14,247), middle-aged (born 1946–1951, n = 13,715) and older (born 1921–1926, n = 12,432) participants from the Australian Longitudinal Study on Women's Health completed six questionnaires between 1996 and 2012 at approximate 3-year intervals. Physical functioning was measured with a 10-item subscale of the Short-Form Health Survey (score 1–100). Relationships between age and physical functioning were modelled using spline regression, stratified by baseline categories of physical activity, alcohol intake, smoking status, level of education, managing on income and index of neighbourhood socio-economic disadvantage for area. Multivariable models excluding one of the six factors were compared with models including all six factors to examine the relative importance of each factor. Women with unhealthy lifestyles (inactive, smokers or risky alcohol intake) and lower SEP had lower levels of physical functioning and more rapid declines across the adult life span. The variables with the greatest relative contribution to the models for physical functioning differed by age cohort: i.e. education and physical activity in younger women, managing on income and physical activity in middle-aged women and physical activity in older women. For optimal physical functioning, socio-economic factors seemed particularly important in younger and middle-aged women, while physical activity seemed important at all ages.

Peeters G, Waller M & Dobson AJ. **SF-36 normative values according to level of functioning in older women.** *Quality of Life Research*, 2019, 28(4); 979-989.

Purpose: The 36-item Medical Outcome Study Short Form (SF-36) survey measures health-related quality of life. Age and disease-specific normative values have been published, but a focus on level of functioning may be more meaningful in case of multimorbidity. We estimated normative values for Australian women aged 79–90 years according to levels of functioning.

Methods: Data were from 6127 (aged 79–84 in 2005) and 3424 (aged 85–90 in 2011) participants in the Australian Longitudinal Study on Women's Health. Surveys included the SF-36 and information on housing. Record linkage to assessment data for access to the national program for aged care support was used to obtain information on participants' need for assistance with 10 activities. Normative values were calculated for physical component (PCS), mental component (MCS), and subscale scores for subsamples defined by types of assistance needed.

Results: At the ages of 79–84, the mean (95% confidence interval) PCS and MCS values for women not needing any assistance were 37.5 (37.2–37.9) and 53.0 (52.8–53.3) compared to 29.0 (27.8–30.2) and 45.9 (44.4–47.4) for women needing any assistance. At ages 85–90, the corresponding PCS values were 34.9 (34.5–35.4) vs. 28.2 (27.4–29.0) and the corresponding MCS values were 53.2 (52.8–53.6)

vs. 48.7 (47.8–49.6). Values were higher for participants living in the community or retirement village vs. nursing homes/hostels. The PCS, MCS and 8 subscale values decreased as the need for assistance with more basic activities increased.

Conclusions: These normative values facilitate meaningful interpretation of SF-36 scores from the perspective of level of functioning.

Rahman M, E, Efirid & Byles JE. **Transitioning of older Australian women into and through the long-term care system: A cohort study using linked data.** *BMC Geriatrics*, 2019, 19; Art. No. 286. <https://doi.org/10.1186/s12877-019-1291-z>

Background: Over two-thirds of older Australians use different types/levels of aged care at some point in later life. Our aims were to estimate transitional probabilities and to identify risk factors influencing the movement between different levels of long-term care.

Methods: The sample consisted of 9007 women from the 1921-26 birth cohort of the Australian Longitudinal Study on Women's Health. Transitional probabilities between different levels of long-term care were estimated using a continuous-time Markov model.

Results: An 11-fold transition rates ratio was observed for the movement from non-user to home and community care (HACC) versus non-user to residential aged care (RAC). The predicted probabilities of remaining in the non-user state, HACC, and RAC after 10 years from the baseline were .28, .24, and .11, respectively. While the corresponding probabilities of dying from these states were .36, .65, and .90. The risk of transitioning from the non-user state to either HACC or RAC was greater for participants who were older at baseline, widowed, living outside of major cities, having difficulties in managing income, or having chronic condition, poor/fair self-rated health, or lower SF-36 scores ($p < .05$).

Conclusion: Women spend a substantial period of their later life using long-term care. Typically, this will be in the community setting with a low level of care. The transition to either HACC or RAC was associated with several demographic and health-related factors. Our findings are important for the planning and improvement of long-term care among future generations of older people.

Rahman M, Efirid JT & Byles JE. **Patterns of aged care use among older Australian women: A prospective cohort study using linked data.** *Archives of Gerontology and Geriatrics*, 2019, 81; 39-47.

Background: Women live longer than men and have an increased need for long-term care. The objective of this study was to identify patterns of aged care use among older Australian women and to examine how these patterns were associated with their demographic and health-related characteristics.

Methods: The sample consisted of 8768 women from the 1921–1926 birth cohort of the Australian Longitudinal Study on Women's Health (ALSWH), who had survived to age 75-80 years. ALSWH survey and linked administrative aged care and death datasets from 2001 to 2011 were utilized. Patterns of aged care use were identified using a repeated measure latent class analysis.

Results: We identified four patterns of aged care use over time, differentiated by timing of service onset, types of service use and time of death. Approximately 41% of the sample were non-users or using basic home and community care (HACC), while 24% were at high risk of using moderate to high-level HACC/community aged care package (CACP). Only 11% had a greater risk of using residential aged care (RAC) over time. Being widowed, residing in remote/regional areas, having difficulty in managing income, having a chronic condition, reporting poor/fair self-rated health, and lower SF-36 quality of life scores were associated with an increased odds of being a member of the following classes: 1) moderate to high-level HACC/CACP, 2) increasing RAC, and 3) early mortality, compared with the non-user class.

Conclusions: Distinct patterns of aged care use were identified. These results will facilitate future capacity planning for aged care systems in Australia.

Rahman M, Byles J. **Older women's patterns of home and community care use and residential transition: An Australian cohort study.** *Maturitas*, 2020, 131; 28-33. (Epub ahead of print 2019).

<https://doi.org/10.1016/j.maturitas.2019.10.004>

Objective: To examine whether patterns of home and community care (HACC) use and person-based characteristics were associated with time to enter permanent residential aged care (RAC).

Study design: A prospective cohort study. The sample consisted of 8062 participants of the Australian Longitudinal Study on Women's Health who used HACC services between 2001 and 2014.

Main outcome measures: Time from first HACC use to enter permanent RAC. The median follow-up time was 63 months. Factors associated with time to enter RAC were identified using competing risk regression models.

Results: Of the 8062 participants, 60% belonged to the 'basic HACC' group, who used few services minimally; 16% belonged to the 'moderate HACC' group, who predominantly used domestic assistance with moderate use of other services; and 24% belonged to the 'complex HACC' group, who used many services frequently. Being a member of the complex HACC group was associated with a lower cumulative incidence of RAC than basic or moderate HACC (chances 15% versus 30% by the median observation period, $p < 0.01$). Living in a remote/outer region (sub-distributional hazard ratio (sdHR) = 0.83, 95%CI: 0.74 - 0.93) was associated with delayed admission to RAC. Meanwhile, earlier admission was associated with living in an apartment (sdHR = 1.29, 95%CI: 1.20-1.40) or a retirement village (sdHR = 1.54, 95%CI = 1.38-1.72), having a physical functioning score < 40 (sdHR = 1.16, 95%CI = 1.05-1.25), and falls with injury (sdHR = 1.15, 95%CI = 1.05-1.25).

Conclusions: Our findings highlight the importance of providing more community care services, age-friendly housing, falls prevention and physical activity programs to reduce inappropriate admission to RAC.

Rahman M, Byles JE. **Trajectories of long-term residential care needs among older Australian women: A cohort study using linked data.** *Journal of the American Medical Directors Association*.

<https://doi.org/10.1016/j.jamda.2019.08.019> (Available online October 2019).

Objective: Older women are more likely than men to enter residential aged care (RAC) and generally stay longer. We aimed to identify and examine their trajectories of care needs over time in RAC across 3 fundamental care needs domains, including activities of daily living (ADL), behavior, and complex health care.

Design: Population-based longitudinal cohort study.

Setting: RAC facilities in Australia.

Participants: A total of 3519 participants from the 1921-1926 birth cohort of the Australian Longitudinal Study on Women's Health (ALSWH), who used permanent RAC between 2008 and 2014.

Methods: We used data from the Aged Care Funding Instrument, National Death Index, and linked ALSWH survey. Participants' care needs in the 3 domains were followed every 6 months up to 60 months from the date of admission to RAC. Trajectories of care needs over time were identified using group-based multitrajectory modeling.

Results: Five distinct trajectory groups were identified, with large variation in the combinations of levels of care needs over time. Approximately 28% of residents belonged to the "high dependent-behavioral and complex need" group, which had high care needs in all 3 domains over time, whereas around one-third of residents (31%) were included in 2 trajectory groups ("less dependent-low need" and "less dependent-increasing need"), which had low or low to medium care needs over time. More than two-fifths of residents (41%) comprised 2 trajectory groups ("high dependent-complex need" and "high dependent-behavioral need"), which had medium to high care needs in 2 domains. Higher age at admission to RAC and multiple morbidities were associated with increased odds of being a member of the high dependent-complex need group than the less dependent-increasing need group.

Conclusions and Implications: Identification of the differential trajectories of care needs among older women in RAC will help to better understand the circumstances of their changing care needs over time. This will facilitate appropriate care planning and service delivery for RAC residents, who are mostly older women.

Rahman M, Eford JT, Kendig H & Byles JE. **Patterns of home and community care use among older participants in the Australian Longitudinal Study of Women's Health.** *European Journal on Ageing*, 2019, 16(3); 293-303.

The aims of this study were to investigate patterns of Home and Community Care (HACC) use and to identify factors influencing first HACC use among older Australian women. Our analysis included 11,133 participants from the Australian Longitudinal Study of Women's Health (1921-26 birth cohort) linked with HACC service use and mortality data from 2001-2011. Patterns of HACC use were analysed using a k-median cluster approach. Multi-variable competing risk analysis was used to estimate risk of first HACC use. Approximately 54% of clients used a minimum volume and number of HACC services; 25% belonged to three complex care use clusters (i.e., higher volume and number of services) while the remainder were intermediate users. Results reveal that initiation of HACC use was significantly associated with 1) living in remote, inner, or regional areas, 2) being widowed or divorced, 3) having difficulty in managing income, 4) not receiving Veteran's Affairs benefits, 5) having chronic conditions, 6) reporting lower scores on the SF-36 health related quality of life, and 7) poor/fair self-rated health .

Our findings highlight the importance of providing a range of services to meet the diverse care needs of older women, especially in the community setting.

Schoenaker DAJM, Callaway LK & Mishra GD. **The role of childhood adversity in the development of gestational diabetes.** *American Journal of Preventive Medicine*, 2019, 57(3); 302-310.

Introduction: The influence of women's childhood psychosocial environment and subsequent preconception mental health on risk of developing gestational diabetes mellitus is unclear. This study examines this relationship.

Methods: Data from a population-based cohort study, the Australian Longitudinal Study on Women's Health, were used. A total of 6,317 women with no pre-existing diabetes were followed from 1996 (aged 18–23 years) until 2015. Gestational diabetes mellitus diagnosis was self-reported. Exposures to eight subcategories of adverse childhood experiences were recalled. Individual subcategories and total number of adverse childhood experiences were examined. Log-binomial regression models with generalized estimating equations were used to estimate RRs and 95% CIs. Analyses were adjusted for early life, preconception, and antenatal gestational diabetes mellitus risk factors. Effect modification by preconception mental health was tested using cross-product terms. Analyses were conducted in 2018.

Results: Among 11,556 pregnancies, 4.7% were complicated by gestational diabetes mellitus. Compared with women not exposed to adverse childhood experiences, exposure to any three adverse childhood experiences (6% of women, adjusted RR=1.73, 95% CI=1.02, 3.01) or four or more adverse childhood experiences (7%, adjusted RR=1.76, 95% CI=1.04, 2.99) was associated with elevated gestational diabetes mellitus risk in women with preconception depressive symptoms. Among the subcategories of adverse childhood experiences, physical abuse, and household substance abuse were associated with higher gestational diabetes mellitus risk. Adverse childhood experiences were not associated with gestational diabetes mellitus in women without depressive symptoms before pregnancy ($p=0.01$, for interaction).

Conclusions: These findings suggest that, in addition to primary prevention of childhood adversity, strategies to curb poor mental health trajectories among women exposed to adverse childhood experiences may contribute to prevention of gestational diabetes mellitus.

Taft A, Powell R, Watson L, Lucke J, Mazza D & McNamee K. **Factors associated with induced abortion over time: Secondary data analysis of five waves of the Australian Longitudinal Study on Women's Health.** *Australian and New Zealand Journal of Public Health*, 2019, 43(2); 137-142.

Objective: A trend analysis of associations with induced abortion.

Methods: Secondary analysis of the 1973/78 cohort of the Australian Longitudinal Study of Women's Health of women responding to two or more consecutive surveys out of five (N=9,042), using generalised estimating equations.

Results: New abortions dropped from 7% to 2% at surveys 4 and 5. By survey 5, 16% of respondents reported abortions, only 2% of them new. Women aged in their twenties were more likely to terminate

a pregnancy if they reported less-effective contraceptives (aOR2.18 CI 1.65–2.89); increased risky drinking (aOR1.65 CI 1.14–2.38); illicit drugs ≤12 months (aOR3.09 CI 2.28–4.19); or recent partner violence (aOR2.42 CI 1.61–3.64). By their thirties, women were more likely to terminate if they reported violence (aOR2.16 CI 1.31–3.56) or illicit drugs <12 months (aOR2.69 CI 1.77–4.09). Women aspiring to be fully- (OR1.58 CI 1.37–1.83) or self-employed (OR1.28 CI 1.04–1.57), with no children (OR1.41 CI 1.14–1.75) or further educated (OR 2.08 CI 1.68–2.57) were more likely to terminate than other women.

Conclusions: Abortion remains strongly associated with factors affecting women’s control over reproductive health such as partner violence and illicit drug use.

Implications for public health: Healthcare providers should inquire about partner violence and illicit drug use among women seeking abortion, support women experiencing harm and promote effective contraception.

Tay CT, Teede HJ, Hill B, Loxton D & Joham AE. **Increased prevalence of eating disorders, low self-esteem, and psychological distress in women with polycystic ovary syndrome: A community-based cohort study.** *Fertility and Sterility*, 2019, 112(2); 353-361.

Objective: To evaluate the prevalence of eating disorders in women with polycystic ovary syndrome (PCOS) compared with women without PCOS and examine the relationship between PCOS, body mass index, self-esteem, and psychological distress scores.

Design: Cross-sectional, community-based study.

Setting: Not applicable.

Patient(s): A total of 8,467 participants born between 1989 and 1995 in the Australian Longitudinal Study on Women's Health with self-reported PCOS status (PCOS n = 875 vs. non-PCOS n = 7,592).
Intervention(s): None.

Main Outcome Measures(s): Self-reported eating disorders, Rosenberg Self-Esteem Scale, and Kessler psychological distress scale.

Result(s): Compared with women not reporting PCOS, women reporting PCOS had higher prevalence of eating disorders (11.0% vs. 7.6%), low self-esteem (31.7% vs. 24.2%), and psychological distress (severe psychological distress: 21.0% vs. 13.5%). After adjusting for confounders, women reporting PCOS were more likely to report eating disorders (adjusted odds ratio [OR] 1.6, 95% confidence interval [CI] 1.2–2.0). Low self-esteem and psychological distress were highly correlated and further increased the odds of eating disorders in women reporting PCOS. Polycystic ovary syndrome was significantly associated with low self-esteem and psychological distress but not after adjusting for confounders. Obesity was associated with low self-esteem (adjusted OR 1.5, 95% CI 1.2–1.8) and psychological distress (adjusted OR 1.2, 95% CI 1.0–1.4) but not eating disorders. Underweight women had increased odds for eating disorders (adjusted OR 2.5, 95% CI 1.8–3.4).

Conclusion(s): Women with PCOS are more likely to report low self-esteem, psychological distress, and eating disorders. Low self-esteem and psychological distress are highly correlated and further

increased the risk for eating disorders.

Tollosa DN, Tavener M, Hure A & James EL. **Compliance with multiple health behaviour recommendations: A cross-sectional comparison between female cancer survivors and those with no cancer history.** *International Journal of Environmental Research and Public Health*, 2019, 16(8); 1345.

Lifestyle behaviours have an important role in preventing cancer, reducing treatment side effects, and improving survival and quality of life for cancer survivors. This study investigated adherence to multiple lifestyle behaviours among women with and without a cancer history. From the Australian Longitudinal Study on Women's Health (ALSWH) surveys, 2407 cancer survivors and 3896 controls (cancer free population) were identified. Based on the World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) recommendations, adherence to six health behaviours (smoking, physical activity, fruit and vegetable intake, alcohol consumption, sugary drink intake, and Body Mass Index [BMI]) were assessed. Overall adherence was low, and there were no differences between survivors and controls on adherence to any of the six individual health behaviours. However, both recent and long-term cancer survivors were more likely than controls to adhere to multiple health behaviours ($p < 0.05$). When participants with melanoma or non-melanoma skin cancer were excluded, adherence was less likely (but not significant) in the cancer group than controls. Higher education ($p < 0.01$), being married ($p < 0.01$), and lower comorbidity of chronic illnesses ($p < 0.01$) were significantly associated with adherence to multiple lifestyle behaviours. Overall, the findings suggest that a cancer diagnosis may result in increased compliance with multiple health behaviour guidelines.

Tooth L, Moss K, Hockey R & Mishra G. **Adherence to screen time recommendations for Australian children aged 0–12 years.** *Medical Journal of Australia*, 2019, 211(4); 181-182.

No abstract available.

Tran TD, Hammarberg K, Ryan J, Lowthian J, Freak-Poli R, Owen A, Kirkman M, Curtis A, Rowe H, Brown H, Ward S, Britt C & Fisher J. **Mental health trajectories among women in Australia as they age.** *Aging & Mental Health*, 2019, 23(7); 887-96.

Objectives: To ascertain the trajectories of mental health among women in Australia assessed in repeat waves from their early 70 s to the end of their lives or their mid 80 s.

Method: Secondary analysis of data contributed by the 1921–26 cohort of the Australian Longitudinal Study of Women's Health Waves 1–6. Primary outcome was the 4-item SF-36 Vitality Subscale, which assesses mental health as life satisfaction, social participation, energy and enthusiasm. Structural, individual and intermediary factors were assessed using study-specific and standardised measures. Trajectories were identified using Growth Mixture Modelling and associations with baseline characteristics with Structural Equation Modelling.

Results: 12,432 women completed Survey One. Three mental health trajectories: stable high (77%);

stable low (18.2%) and declining from high to low (4.8%) were identified. Compared to the stable high group, women in the stable low group were significantly less physically active, had more nutritional risks, more recent adverse life events, fewer social interactions and less social support, reported more stress and were more likely to have a serious illness or disability at Survey One. The declining group had similar characteristics to the stable high group, but were significantly more likely to report at baseline that they had experienced recent financial, physical and emotional elder abuse. These interact, but not directly with socioeconomic position and marital status.

Conclusion: Mental health among older women is related to social relationships, general health, access to physical activity and healthy nutrition, coincidental adverse life events and experiences of interpersonal violence, in particular elder abuse.

William J, Loong B, Chojenta C & Loxton D. **The profiles of public and private patients in maternal healthcare: a longitudinal study to examine adverse selection.** *Annals of Actuarial Science*, 2020, 14(1); 129-137. <https://doi.org/10.1017/S1748499519000083> (Published online June 2019).

In this article, we investigate differences in the profiles of patients within the Australian mixed public-private maternal health system to examine the extent of adverse selection. There are conflicting influences on adverse selection within the private health sector in Australia due to government regulations that incentivise lower risk segments of the population to purchase community-rated private health insurance. We use a two-phase modelling methodology that incorporates statistical learning and logistic regression on a dataset that links administrative and longitudinal survey data for a large cohort of women. We find that the key predictor of private patient status is having private health insurance, which itself is largely driven by sociodemographic factors rather than health-or pregnancy-related factors. Additionally, transitioning between the public-private systems for a subsequent pregnancy is uncommon; however, it is primarily driven by changes in private health insurance when it occurs. Other significant factors when transitioning to the private system for a second pregnancy are hypertension, increased access to specialists and stress related to previous motherhood experiences. Consequently, there is limited evidence of adverse selection in this market, with targeted financial incentives likely outweighing the impact of community rating even during childbearing years where private health service use increases.

Wilson LF, Pandeya N, Byles J & Mishra G. **Hysterectomy status and all-cause mortality in a 21-year Australian population-based cohort study.** *American Journal of Obstetrics and Gynecology*, 2019, 220(1); 83.e1-83.e11

Background: Hysterectomy is a common surgical procedure, predominantly performed when women are between 30 and 50 years old. One in 3 women in Australia has had a hysterectomy by the time they are 60 years old, and 30% have both ovaries removed at the time of surgery. Given this high prevalence, it is important to understand the long-term effects of hysterectomy. In particular, women who have a hysterectomy/oophorectomy at younger ages are likely to be premenopausal or perimenopausal and may experience greater changes in hormone levels and a shortened reproductive lifespan than women

who have a hysterectomy when they are older and postmenopausal. Use of menopausal hormone therapy after surgery may compensate for these hormonal changes. To inform clinical decisions about postsurgery management of women who have a hysterectomy prior to menopause (ie, average age at menopause 50 years), it is useful to compare women with a hysterectomy to women with no hysterectomy and to stratify the hysterectomy status by whether or not women have had a bilateral oophorectomy, or used menopausal hormone therapy.

Objective: We sought to investigate whether women who had a hysterectomy with ovarian conservation or a hysterectomy and bilateral oophorectomy before the age of 50 years were at a higher risk of premature all-cause mortality compared to women who did not have this surgery before the age of 50 years. We also sought to explore whether use of menopausal hormone therapy modified these associations.

Study Design: Women from the midcohort (born 1946 through 1951) of the Australian Longitudinal Study on Women's Health were included in our study sample (n = 13,541). Women who reported a hysterectomy (with and without both ovaries removed) before the age of 50 years were considered exposure at risk and compared with women who did not report these surgeries before age 50 years. To explore effect modification by use of menopausal hormone therapy we further stratified hysterectomy status by menopausal hormone therapy use. Risk of all-cause mortality was assessed using inverse-probability weighted Cox regression models.

Results: During a median follow-up of 21.5 years, there were 901 (6.7%) deaths in our study sample. Overall, there was no difference in all-cause mortality between women who reported a hysterectomy with ovarian conservation (hazard ratio, 0.86; 95% confidence interval, 0.72–1.02) or women who reported a hysterectomy and bilateral oophorectomy (hazard ratio, 1.02; 95% confidence interval, 0.78–1.34) and women with no hysterectomy. When stratified by menopausal hormone therapy use, women with hysterectomy and ovarian conservation before the age of 50 years were not at higher risk of all-cause mortality compared to no hysterectomy, regardless of menopausal hormone therapy use status. In contrast, among nonusers of menopausal hormone therapy only, women who reported a hysterectomy-bilateral oophorectomy before the age of 50 years were at a higher risk of death compared to women with no hysterectomy (hazard ratio, 1.81; 95% confidence interval, 1.01–3.25).

Conclusion: Hysterectomy with ovarian conservation before the age of 50 years did not increase risk of all-cause mortality. Among nonmenopausal hormone therapy users only, hysterectomy and bilateral oophorectomy before the age of 50 years was associated with a higher risk of death

Wubishet BL, Harris ML, Forder PM, Acharya SH & Byles JE. **Predictors of 15-year survival among Australian women with diabetes from age 76–81.** *Diabetes Research and Clinical Practice*, 2019, 150; 48-56.

Aims: To assess the impact of diabetes on the survival of older women, adjusted for other all-cause mortality predictors.

Methods: Data were used from the 1921–26 cohort of the Australian Longitudinal Study on Women's Health, when the women were aged 76–81 years at baseline, with linkage to the National Death Index.

Survival curves were plotted to compare the survival of women with no diabetes, incident diabetes and prevalent diabetes over 15 years. Cox proportional hazards models were used to examine the association between diabetes and all-cause mortality risks.

Results: A total of 972 (11.7%) of 8296 eligible women reported either incident, 522 (6.3%) or prevalent, 450 (5.4%) diabetes. The median survival times were 10.1, 11.4 and 12.7 years among women with prevalent, incident and no diabetes, respectively. The risks of death were 30% [HR: 1.30 (95% CI: 1.16–1.45)] and 73% [HR: 1.73 (CI: 1.57–1.92)] higher for women with incident and prevalent diabetes compared to women without diabetes. These associations were sustained after controlling for demographics, body mass index, smoking status, comorbidities and health care use.

Conclusions: This study revealed that diabetes is associated with reduced survival probabilities for older women with minimal moderation after adjustment for other predictors. Our findings suggest that diabetes management guidelines for older women need to integrate factors such as comorbidities, smoking and being underweight to reduce the risk of mortality.

Xu X, Mishra GD & Jones M. **Trajectories of mental health symptoms for women in their 20s predict the onset of chronic physical conditions in their 30s: Two decades of follow-up of young Australian women.** *Journal of Affective Disorders*, 2019, 246; 394-400.

Background: Mental health symptoms are highly prevalent and dynamic among young people. Little is known about the trajectories of these symptoms and subsequent development of chronic conditions. This study examines whether (1) mental health trajectories can predict the onset of chronic conditions in young women and (2) trajectories are stronger predictors of the incidence of these conditions than mental health status measured at single time point.

Methods: 6013 young Australian women were followed every 3-year for 20 years. The mental health trajectories in their 20s and mental health status 3-year before the onset of chronic conditions were used to predict the incidence of six chronic conditions in their 30s. Mental health trajectories were identified using latent mixture modelling of five-item Mental Health Index.

Results: Five mental health trajectories were identified: maintaining a high score (high-stable); starting low then steadily increasing (improving); moderately high score, declining, then increasing (declining-improving); starting high then steadily decreasing (declining), and maintaining a low score (low-stable). In their 30s, 1015 (16.9%) women developed one or more conditions. The low-stable and declining groups were associated with increased odds of developing one or more conditions by 45% (odds ratio [OR] 1.45, 95% confidence interval [CI] 1.09–1.94) and 48% (OR 1.48, 95% CI 1.10–1.98), respectively, compared with the high-stable group. These are not so clearly distinguished by only considering mental health status at single time.

Limitation: Self-reported chronic conditions.

Conclusion: Mental health symptom trajectories in women's 20s are associated with the onset of chronic physical conditions in their 30s.

Xu X, Mishra GD & Jones M. **Depressive symptoms and the development and progression of physical multimorbidity in a national cohort of Australian women.** *Health Psychology*, 2019, 38(9); 812-821.

Objective: Multiple chronic physical conditions (physical multimorbidity) are common in people with depression. This study investigated the association between elevated depressive symptoms and the development and progression of physical multimorbidity in middle-aged women.

Methods: A total of 7,407 women aged 45-50 years were followed up from 1996 to 2016. These women were free from diagnosed depression or chronic physical conditions at baseline. Data on depressive symptoms and chronic physical conditions were updated every 3 years, with depressive symptoms assessed using the Center for Epidemiological Studies-Depression scale. A 1-to-1 matched cohort analysis was conducted to compare the cumulative incidence and odds of physical multimorbidity between women with (depressed cohort) and women without (nondepressed cohort) elevated depressive symptoms, adjusted for sociodemographic and health behavioral factors.

Results: Over 20 years of follow-up, 3,199 women (43.2%) reported elevated depressive symptoms. Of these, 2,035 (63.6%) developed physical multimorbidity. After the onset of elevated depressive symptoms, women had a more than 4-fold increase in cumulative incidence of multimorbidity. Compared with the nondepressed cohort, the odds of the depressed cohort developing multimorbidity before the onset of depressive symptoms was 1.81 (95% confidence interval = 1.49, 2.20). After the onset of depressive symptoms, the odds ratio was 2.38 (95% confidence interval = 2.20, 2.57).

Conclusions: Elevated depressive symptoms were common in women's midlife. Women with elevated depressive symptoms had increased odds of physical multimorbidity both before and after the onset of depressive symptoms. These findings support the emerging integrated management and prevention of mental and physical multimorbidity.

Xu X, Mishra GD & Jones M. **Short-term weight gain is associated with accumulation of multimorbidity in mid-aged women: A 20-year cohort study.** *International Journal of Obesity*, 2019, 43(9); 1811-1821.

Background/objectives: Although weight change has been studied in relation to many individual chronic conditions, limited studies have focused on weight change and multimorbidity. This study examines the relationship between short-term weight change and the accumulation of multimorbidity in midlife.

Methods: We used data from 7357 women aged 45–50 years without a history of any chronic conditions. The women were surveyed approximately every 3 years from 1996 to 2016. Associations between short-term weight change and accumulation of multimorbidity (two or more of nine chronic conditions) over each 3-year period, adjusting for baseline body mass index (BMI) or time-varying BMI (3-year period), were examined using repeated measures models. Short-term weight change was categorised into seven groups of annual weight change from high weight loss ($\leq -5\%$) to high weight gain ($> +5\%$).

Results: Over 20 years, 60.4% (n = 4442) of women developed multimorbidity. Baseline BMI, time-varying BMI and short-term weight gain were all associated with the accumulation of multimorbidity. After controlling for sociodemographic, lifestyle factors and menopausal status, high weight gain was associated with a 25% increased odds of multimorbidity (odds ratio (OR) 1.25, 95% confidence interval (CI) 1.08–1.45) compared with maintaining a stable weight. The results were consistent among models adjusting for baseline BMI (OR 1.24, 95% CI 1.07–1.44) or time-varying BMI (OR 1.34, 95% CI 1.16–1.54). Weight loss was associated with increased odds of multimorbidity in women with normal BMI (baseline or time-varying).

Conclusions: Short-term weight gain is associated with significantly increased odds of multimorbidity in mid-aged women. This association is independent from baseline BMI (at 45–50 years) and time-varying BMI. These findings support a persistent weight management regime and prevention of weight gain throughout women's midlife.

Yu S & Byles J. **Waiting times in aged care: What matters?** *Australasian Journal on Ageing*, 2019. <https://doi.org/10.1111/ajag.12665> (Published online May 2019)

Objective: To assess consumer-level socioeconomic factors associated with waiting times for access to aged care services, specifically community-based care and permanent residential care.

Methods: Administrative data on assessment outcomes and admissions to services were linked with survey data at the person-level and were used to implement a competing risks regression model. We estimated the association between health needs, and socioeconomic variables and subsequent waiting periods for individuals with approval for access.

Results: The main consumer-level factors driving waiting time were the individual's assessed needs, including health status, whether they lived alone and age. We found no evidence that socioeconomic status was associated with waiting times for community-based care; however, admission to residential care reflected socioeconomic factors including education levels and geographical isolation.

Conclusion: This paper provides baseline evidence for factors affecting wait times in aged care, essential for evaluating subsequent policy reforms aimed at reducing wait times and increasing equity of access and consumer choice.

Zhu D, Chung HF, Pandeya N, Dobson AJ, Hardy R, Kuh D, Brunner EJ, Bruinsma F, Giles GG, Demakakos P, Lee JS, Mizunuma H, Hayashi K, Adami HO, Weiderpass E & Mishra GD. **Premenopausal cardiovascular disease and age at natural menopause: A pooled analysis of over 170,000 women.** *European Journal of Epidemiology*, 2019, 34(3); 235-246.

Early menopause is associated with an increased risk of subsequent cardiovascular disease (CVD). Few studies have investigated the converse. We examined whether premenopausal CVD events are associated with early age at menopause. We pooled the individual data of 177,131 women from nine studies. We used multinomial logistic regression models to estimate multivariable relative risk ratios (RRR) and 95% confidence intervals (CI) for the associations between age at onset of premenopausal CVD events-including coronary heart disease (CHD) and stroke-and age at natural menopause.

Altogether 1561 (0.9%) premenopausal participants reported CVD events (including 1130 CHD and 469 stroke) at a mean age of 41.3 years. Compared with women without any premenopausal CVD events, women who experienced a first CVD event before age 35 years had a twofold risk of menopause before age 45 years (early menopause); adjusted RRR (95% CI) of 1.92 (1.17, 3.14) for any CVD, 1.86 (1.01, 3.43) for CHD and 2.17 (1.43, 3.30) for stroke. Women who experienced a first premenopausal CVD event after age 40 years underwent a natural menopause at the expected age (around 51 years). These associations were robust to adjustment for smoking status, BMI, educational level, race/ethnicity, age at menarche, parity, hypertension and family history of CVD. For premenopausal women, a first CVD event before age 35 years is associated with a doubling of the risk of an early menopause, while a first CVD event occurred after 35 years indicates a normal menopause at around 51 years. Shared genetic and environmental factors (such as smoking), as well as compromised vasculature following CVD events, may contribute to this outcome.

Zhu D, Chung H-F, Dobson A, Pandeya N, Giles GG, Bruinsma F, Brunner EJ, Kuh D, Hardy R, Avis NE, Gold EB, Derby CA, Matthews KA, Cade JE, Greenwood DC, Demakakos P, Brown DE, Sievert LL, Anderson D, Hayashi K, Lee JS, Mizunuma H, Tillin T, Simonsen MK, Adami H-O, Weiderpass E & Mishra GD. **Age at natural menopause and risk of incident cardiovascular disease: A pooled analysis of individual patient data.** *The Lancet Public Health*, 2019, 4(11); e553-e564.

Background: Early menopause is linked to an increased risk of cardiovascular disease mortality; however, the association between early menopause and incidence and timing of cardiovascular disease is unclear. We aimed to assess the associations between age at natural menopause and incidence and timing of cardiovascular disease.

Methods: We harmonised and pooled individual-level data from 15 observational studies done across five countries and regions (Australia, Scandinavia, the USA, Japan, and the UK) between 1946 and 2013. Women who had reported their menopause status, age at natural menopause (if postmenopausal), and cardiovascular disease status (including coronary heart disease and stroke) were included. We excluded women who had hysterectomy or oophorectomy and women who did not report their age at menopause. The primary endpoint of this study was the occurrence of first non-fatal cardiovascular disease, defined as a composite outcome of incident coronary heart disease (including heart attack and angina) or stroke (including ischaemic stroke or haemorrhagic stroke). We used Cox proportional hazards models to estimate multivariate hazard ratios (HRs) and 95% CIs for the associations between age at menopause and incident cardiovascular disease event. We also adjusted the model to account for smoking status, menopausal hormone therapy status, body-mass index, and education levels. Age at natural menopause was categorised as premenopausal or perimenopausal, younger than 40 years (premature menopause), 40–44 years (early menopause), 45–49 years (relatively early), 50–51 years (reference category), 52–54 years (relatively late), and 55 years or older (late menopause).

Findings: Overall, 301 438 women were included in our analysis. Of these 301 438 women, 12 962 (4.3%) had a first non-fatal cardiovascular disease event after menopause, of whom 9369 (3.1%) had

coronary heart disease and 4338 (1.4%) had strokes. Compared with women who had menopause at age 50–51 years, the risk of cardiovascular disease was higher in women who had premature menopause (age <40 years; HR 1.55, 95% CI 1.38–1.73; $p<0.0001$), early menopause (age 40–44 years; 1.30, 1.22–1.39; $p<0.0001$), and relatively early menopause (age 45–49 years; 1.12, 1.07–1.18; $p<0.0001$), with a significantly reduced risk of cardiovascular disease following menopause after age 51 years ($p<0.0001$ for trend). The associations persisted in never smokers, and were strongest before age 60 years for women with premature menopause (HR 1.88, 1.62–2.20; $p<0.0001$) and early menopause (1.40, 1.27–1.54; $p<0.0001$), but were attenuated at age 60–69 years, with no significant association observed at age 70 years and older.

Interpretation: Compared with women who had menopause at age 50–51 years, women with premature and early menopause had a substantially increased risk of a non-fatal cardiovascular disease event before the age of 60 years, but not after age 70 years. Women with earlier menopause need close monitoring in clinical practice, and age at menopause might also be considered as an important factor in risk stratification of cardiovascular disease for women.

Accepted Papers

Aljadani HM, Patterson A, Sibbritt D, Taylor RM & Collins CE. **Improving diet quality over nine-years is associated with less weight gain in mid-age Australian women: A cohort study.** *Nutrition, Metabolism and Cardiovascular Diseases*. <https://doi.org/10.1016/j.numecd.2019.10.003>

Background and aims: Most studies measure baseline diet quality exclusively and hence the impact of longitudinal changes in dietary intake in relation to weight change is not considered. Therefore, this study aimed to examine whether change in diet quality over nine-years was associated with weight change over the same period in mid-age Australian women.

Methods and results: Healthy mid-age (45–49 years) women from the Australian Longitudinal study on Women's Health (ALSWH) were eligible a valid total energy intake (TEI) was reported at baseline (n = 2381), determined using Goldberg cut-offs. Diet quality was measured by the Australian Recommended Food Score (ARFS) using data derived from a validated food frequency questionnaire. Multiple linear regressions were used to evaluate relationships between change in diet quality and weight in mid-age women (n = 1999). Women in the highest tertile of ARFS change improved diet quality [mean ± SD] [7 ± 4 points], while those in the lowest [-9 ± 5 points] and middle [-1 ± 2 points] tertiles had worse diet quality at follow-up. Overall, mean weight gain was 2.3 ± 7.2 kg over nine years. Those in the highest tertile of ARFS change gained significantly less weight, compared to the lowest tertile; $\beta = -1.2$ kg [95% CI: -2.31, -0.11; p = 0.03] after adjustment for changes in confounders and baseline weight, baseline ARFS, and total energy intake.

Conclusions: Improving diet quality could be an important strategy for promoting modest weight loss and potentially contribute to preventing weight gain in mid-age women, which is important for metabolic health.

Aljadani HM, Patterson A, Sibbritt D, Taylor RM & Collins CE. **Frequency and variety of usual intakes of healthy foods, fruit and vegetables predicts lower 6-year weight gain in young women.** *European Journal of Clinical Nutrition*.

Background/objectives: We previously demonstrated that fruit and vegetable consumption, was associated with less weight gain over 6 years in young women for all body mass index (BMI) categories. This study evaluated the relationship between diet quality and 6-year weight change, in Australian women initially in the healthy weight range (≥ 18.5 BMI < 25 kg/m²) at baseline.

Subjects/methods: A total of 4083 young women (27–31 years) in the healthy weight range (≥ 18.5 BMI < 25 kg/m²) enrolled in the Australian Longitudinal study on Women's Health (ALSWH) were analysed. Diet quality was measured by the Australian Recommended Food Score (ARFS) and the Fruit and Vegetable Index (FAVI) using dietary data derived from a validated food frequency

questionnaire. Weight change was calculated as the difference between baseline and 6-year follow-up weight (kg). Multiple linear regression models were used to analyse the association between baseline ARFS and FAVI and 6-year weight change.

Results: At baseline, mean diet quality was low for both indices [ARFS (maximum 72) = 29.9 and FAVI (maximum 333) = 94.2] and women gained 3.7 kg of weight during 6 years of follow-up. Regression modelling revealed that every one point increase over 6 years in either the ARFS or FAVI score was associated with statistically significantly less weight gain over 6 years, although the amount was small (33 and 12 g, respectively).

Conclusions: Higher diet quality predicts lower prospective weight gain in young women however, further research is needed over a longer follow-up period and in diverse population groups.

Baldwin JN, Forder P, Haslam R, Hure A, Loxton DJ, Patterson AJ & Collins CE. **Change in diet quality over 12 years in the 1946-51 cohort of the Australian Longitudinal Study on Women's Health.** *Nutrients*.

Understanding patterns of dietary change over time can provide important information regarding population nutrition behaviours. The aims were to investigate change in diet quality over 12 years in a nationally representative sample of women born in 1946–1951 and to identify characteristics of women whose diet quality changed over time. The Australian Recommended Food Score (ARFS) was measured in 2001 (n = 10,629, mean age 52.1 years) and 2013 (n = 9115; n = 8161 for both time points) for the mid-aged cohort from the Australian Longitudinal Study on Women's Health. Participants were categorised by tertiles of baseline diet quality and also classified as 'diet quality worsened' (ARFS decrease ≤ -4 points, n = 2361), 'remained stable' ($-3 \leq$ change in ARFS ≤ 3 points, n = 3077) or 'improved' (ARFS increase ≥ 4 points, n = 2723). On average, ARFS total and subscale scores remained relatively stable over time (mean [SD] change 0.3 [7.6] points) with some regression to the mean. Women whose diet quality worsened were more likely to be highly physically active at baseline compared with women whose diet quality improved (p < 0.001). Among women with poor diet quality initially (lowest baseline ARFS tertile, n = 2451, mean [SD] baseline ARFS 22.8 [4.5] points), almost half (47%, n = 1148) had not improved after 12 years, with women less likely to be in the healthy weight range (41% compared to 44%) and be never smokers (56% versus 62%, p < 0.05) compared with those whose diet improved. Diet quality remained relatively stable over 12 years' follow up among mid-aged women. Almost half of those with poor baseline diet quality remained poor over time, emphasizing the need to target high-risk groups for nutrition interventions.

Copp T, Cvejic E, McCaffery K, Hersch J, Doust J, Mol BW, Dokras A, Mishra G & Jansen J. **Impact of a diagnosis of polycystic ovary syndrome on diet, physical activity and contraceptive use in young women: Findings from the Australian Longitudinal Study of Women's Health.** *Human Reproduction*.

No abstract available.

Hendryx M, Luo J, Chojenta C, Byles J. **Latent class analysis of low birth weight and preterm delivery among Australian women.** *The Journal of Pediatrics.*

No abstract available.

Luo J, Hodge A, Hendryx M & Byles JE. **Age of obesity onset, cumulative obesity exposure over early adulthood and risk of type 2 diabetes.** *Diabetologia.*

Aims/hypothesis: Obesity is a risk factor for type 2 diabetes, yet little is known about how timing and cumulative exposure of obesity are related to disease risk. The aim of this study was to examine the associations between BMI trajectories, age of onset of obesity and obese-years (a product of degree and duration of obesity) over early adulthood and subsequent risk of type 2 diabetes.

Methods: Women aged 18–23 years at baseline (n = 11,192) enrolled in the Australian Longitudinal Study on Women's Health (ALSWH) in 1996 were followed up about every 3 years via surveys for up to 19 years. Self-reported weights were collected up to seven times. Incident type 2 diabetes was self-reported. A growth mixture model was used to identify distinct BMI trajectories over the early adult life course. Cox proportional hazards regression models were used to examine the associations between trajectories and risk of diabetes.

Results: One hundred and sixty-two (1.5%) women were newly diagnosed with type 2 diabetes during a mean of 16 years of follow-up. Six distinct BMI trajectories were identified, varying by different initial BMI and different slopes of increase. Initial BMI was positively associated with risk of diabetes. We also observed that age at onset of obesity was negatively associated with risk of diabetes (HR 0.87 [95% CI 0.79, 0.96] per 1 year increment), and number of obese-years was positively associated with diabetes (p for trend <0.0001).

Conclusions/interpretation: Our data revealed the importance of timing of obesity, and cumulative exposure to obesity in the development of type 2 diabetes in young women, suggesting that preventing or delaying the onset of obesity and reducing cumulative exposure to obesity may substantially lower the risk of developing diabetes.

Mena GP, Mielke GI & Brown WJ. **Do physical activity, sitting time, and body mass index affect fertility over a 15 year period in women? Data from a large population-based cohort study,** *Human Reproduction.*

No abstract available.

Rayner J, D'Arcy E, Ross LJ, Hodge A & Schoenaker DAJM. **Carbohydrate restriction in midlife is associated with higher risk of type 2 diabetes among Australian women: A cohort study.** *Nutrition, Metabolism and Cardiovascular Diseases.*

Background and aims: Low-carbohydrate diets (LCDs) are increasingly popular but may be

nutritionally inadequate. We aimed to examine if carbohydrate restriction in midlife is associated with risk of developing type 2 diabetes (T2DM), and if this association differs by previous gestational diabetes (GDM) diagnosis.

Methods and results: Dietary intake was assessed for 9689 women from the Australian Longitudinal Study on Women's Health in 2001 (aged 50–55) and 2013 (aged 62–67) via validated food frequency questionnaires. Average long-term carbohydrate restriction was assessed using a low-carbohydrate diet score (highest quartile (Q4) indicating lowest proportion of energy from carbohydrates). Incidence of T2DM between 2001 and 2016 was self-reported at 3-yearly surveys. Log-binomial regression was used to estimate relative risks (RR) and 95% CIs. During 15 years of follow-up, 959 women (9.9%) developed T2DM. Carbohydrate restriction was associated with T2DM after adjustment for sociodemographic factors, history of GDM diagnosis and physical activity (Q4 vs Q1: RR 1.27 [95% CI 1.10, 1.48]), and this was attenuated when additionally adjusted for BMI (1.10 [0.95, 1.27]). Carbohydrate restriction was associated with lower consumption of fruit, cereals and high-fibre bread, and lower intakes of these food groups were associated with higher T2DM risk. Associations did not differ by history of GDM (P for interaction >0.15).

Conclusion: Carbohydrate restriction was associated with higher T2DM incidence in middle-aged women, regardless of GDM history. Health professionals should advise women to avoid LCDs that are low in fruit and grains, and to consume a diet in line with current dietary recommendations.

Rowlands IJ, Holder C, Forder PM, Hegarty K, Dobson AJ, Loxton D. **Consistency and inconsistency of young women's reporting of intimate partner violence in a population-based study.** *Violence Against Women.*

No abstract available.

Reports

Policy briefs from the Australian Longitudinal Study on Women's Health. Mishra G, Byles J, Dobson A, Chan H-W, Tooth L, Hockey R, Townsend N & Loxton D. Report prepared for the Australian Government Department of Health, February 2019.

Family, Domestic, and Sexual violence: Compendium of infographics – Findings from the Australian Longitudinal Study on Women's Health. Loxton D, Townsend N, Barnes I, Forder P. Report prepared for the Australian Government of Social Services, September 2019.

Family, Domestic and Sexual Violence: Interactive layered maps - Findings from the Australian Longitudinal Study on Women's Health. Loxton D, Tegegne TK, Forder P, Townsend N, Graves A. Report prepared for the Australian Government Department of Social Services, September 2019.

Family, Domestic and Sexual Violence: Compendium of maps - Findings from the Australian Longitudinal Study on Women's Health. Loxton D, Tegegne TK, Forder P, Townsend N, Graves A. Report prepared for the Australian Government Department of Social Services, September 2019.

Family, Domestic and Sexual Violence: Mini report of infographics - Findings from the Australian Longitudinal Study on Women's Health. Loxton D, Townsend N, Barnes I, Forder P. Report prepared for the Australian Government Department of Social Services, September 2019.

Conference Presentations

In 2019, ALSWH data were used in 54 conference presentations.

Abbas SS. **Matters of the heart – Medications for atrial fibrillation.** *The Australian Society for Medical Research (ASMR) 6th Annual Newcastle Satellite Scientific Meeting*, Newcastle, NSW, 3 June 2019.

Byles J. Health and wellbeing: **Golden assets in a silver world.** *IAGG 11th IAGG Asia/Oceania Regional Congress*, Taipei, Taiwan, 23-27 October 2019.

Byles J, Rahman M, Princehorn E, Holliday E & Jagger C. **Successful ageing from old to very old: Findings from the Australian Longitudinal Study on Women's Health.** *IAGG-ER 9th European Congress of the International Association of Gerontology and Geriatrics*, Gothenburg, Sweden, 23 - 25 May 2019.

Byles J, Rahman M, Princehorn E, Holliday E & Jagger C. **Successful ageing from old to very old: Findings from the Australian Longitudinal Study on Women's Health.** *52nd AAG Conference*, Sydney, NSW, 5 -8 November 2019.

Bennett C, Cain S, Blumfield M. **Dietary monounsaturated fat intake may be protective for sleep during pregnancy.** *DOHaD 2019: Investing in a Healthy Future for All: Research, Education, Policy*, Melbourne, VIC, 20-23 October 2019.

Bennett C, Cain S, Blumfield M. **Sleeping behaviour during pregnancy increases the risk of adverse birth and postpartum outcomes.** *DOHaD 2019: Investing in a Healthy Future for All: Research, Education, Policy*, Melbourne, VIC, 20-23 October 2019.

Bennett C, Cain S, Blumfield M. **Monounsaturated fat intake may protect against poor quality sleep during pregnancy.** *Nutrition Society of Australia 43rd Annual Scientific Meeting*, Newcastle, NSW, 3 December 2019.

Bennet CJ, Mansfield D, Mo L, Hodge A, Joham J Cain S, Blumfield M, Teede H & Moran L. **Sleeping behaviour in women with and without polycystic ovary syndrome (PCOS) and their association with lifestyle factors (diet, physical activity and sitting time).** *Nutrition Society of Australia 43rd Annual Scientific Meeting*, Newcastle, NSW, 3 December 2019.

Campbell A. **Sexual-identity fluidity and depression in a national cohort of young Australian women.** *Australian Public Health Conference*, 2019, Adelaide, SA, 17 September 2019.

Cao S. **History of premenstrual syndrome and postpartum depression: A systematic review and meta-analysis.** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019*, Brisbane, QLD, 23-25 October 2019.

Cavenagh D, Byles JE, Forder P. **Primary and specialist care amongst older Australian women with and without dementia.** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019*, Brisbane, QLD, 23-25 October 2019.

Chung HF. **Premenopausal cardiovascular disease and risk of early menopause: A pooled analysis.** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019*, Brisbane, QLD, 23-25 October 2019.

Copp T. **“I wonder whether it would have been better not to know” Polycystic ovary syndrome (PCOS) and the potential for overdiagnosis.** *Preventing Overdiagnosis 2019*, Sydney, NSW, 5-7 December 2019.

Dobson A. **Impact of dementia on health service use.** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019*, Brisbane, QLD, 23-25 October 2019.

Dobson A. **Flexible age-period-cohort modelling illustrated using obesity prevalence data.** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019*, Brisbane, QLD, 23-25 October 2019.

Downing KL, Mishra GD, Salmon J, Timperio A & Hesketh KD. **Differences in BMI and obesity-related movement behaviours of children with and without a family history of lifestyle diseases.** *2019 International Society of Behavioral Nutrition and Physical Activity (ISBNPA) Annual Meeting*, Prague, Czech Republic, 4 - 7 June 2019.

Engel RM, de Luca K, Graham P, Kaboli Farshchi M, Vemulpad S & Byles J. **Breathing difficulty, chest and back pain predict bronchitis and emphysema in women.** *2019 Thoracic Society of Australia and New Zealand Scientific Research Society Annual Scientific Meeting*, Gold Coast, QLD, 29 March - 2 April 2019.

Engel R, De Luca K, Graham P, Kaboli Farshchi M, Vemulpad S & Byles J. **Breathing difficulty, chest and back pain predict bronchitis and emphysema in women: A potential role for chiropractors in chronic respiratory disease management?** *Chiropractic Australia National Conference*, Gold Coast, QLD, 23 - 25 August 2019.

Engel R, De Luca K, Graham P, Kaboli Farshchi M, Vemulpad S & Byles J. **A potential role for chiropractors in the early detection and management of women at risk of developing chronic respiratory disease later in life.** *Australian Chiropractors Association Conference*, Melbourne, VIC, 18 - 20 October 2019.

Francis L & Stulz V. **Finding a life without domestic violence: A mixed methods study.** *4th Australian Nursing and Midwifery Conference*, Newcastle, NSW, 2 - 3 May 2019.

Gardiner P. **The impact of health behaviours on health expectancy of falls. (Oral poster presentation).** *2019 International Association of Gerontology and Geriatrics European Region Congress*, Gothenburg, Sweden, 23 - 25 May 2019.

Hill B, Ling B, Skouteris H, Bruce L, Moran L, Teede H, & Mishra G. **Lifestyle and psychological characteristics of women with pregnancy intentions** (poster). *Australasian Society of Lifestyle Medicine Conference*, Auckland, New Zealand, 7 - 9 June 2019.

Hill B, Ling B, Skouteris H, Bruce L, Moran L, Teede H, & Mishra G. **Associations between future parenthood aspirations and lifestyle and psychological characteristics in women.** *Australasian Society of Lifestyle Medicine Conference*, Auckland, New Zealand, 7 - 9 June 2018.

Kanesarajah J. **Multimorbidity index trajectories and health service use: A data linkage study.** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019*, Brisbane, QLD, 23-25 October 2019.

*Lamerton T. **Excess weight, physical activity, and urinary incontinence in young women: Findings from the Australian Longitudinal Study of Women's Health.** *2019 AICS Sports Medicine Australia (SMA) Conference*, Sunshine Coast, 23-26 October 2019.

*Winner of the conference 'Early Career Award' for research in Physical Activity and Health.

Loos C. **Understanding intergenerational health: Methodology of the Mothers and their Children's Health Study.** *Australasian Epidemiological Association (AEA) Annual Scientific*

Meeting 2019, Brisbane, QLD, 23-25 October 2019.

Loxton D. **Adverse childhood experiences: Findings from the Australian Longitudinal Study on Women's Health.** *16th Annual Hawaii International Summit on Preventing, Assessing and Treating Trauma Across the Lifespan.* Honolulu, Hawaii, 23 - 26 April 2019.

Loxton D. **From the sublime to the ridiculous: recruiting and retaining longitudinal study participants in the third millennium dimension.** *European Survey Research Association Conference, Zagreb, Croatia, 15 - 19 July 2019.*

Madigan C, Pavey T, Daley AJ, Jolly K & Brown WJ. **The prevalence of weight cycling and associations with weight change and health outcomes (over 12 years).** *Australian New Zealand Obesity Society – Australasian Society for Lifestyle Medicine – International Chair on Cardiometabolic Risk (ANZOS-ASLM-ICCR) Joint Conference on Obesity and Related Chronic Diseases 2019, Sydney, NSW, 16-18 October, 2019.*

*Mena GP, Mielke GI & Brown WJ. **Do physical activity and sitting time affect associations between BMI and fertility in women? Data from a large population-based cohort study.** *2019 ASICS Sports Medicine Australia (SMA) Conference, Sunshine Coast, QLD, 23 - 26 October 2019.*

*Winner of the conference 'Wendy Ey' award for research relating to women's participation in sport/exercise/physical activity.

Mishra SR. **Oestrogen-exposure and cardiovascular disease events, all-cause and cardiovascular mortality: A systematic review.** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019, Brisbane, QLD, 23-25 October 2019.*

Mishra G. **Causes and consequences of premature and early menopause: results from the InterLACE consortium.** *12th European Congress on Menopause and Andropause, Berlin, Germany, 15 -17 May 2019.*

Mishra G. **Epidemiology of endometriosis.** *Australasian Gynaecological Endoscopy & Surgery Society (AGES) and The World Endometriosis Society (WES) Focus Meeting 2019: The Limits and Limitations of Surgery and Endometriosis, Melbourne, VIC, 2 - 3 August 2019.*

Mishra G. **Epidemiology of endometriosis.** *Society for Reproductive Biology Meeting, Sydney, NSW, 17 August 2019.*

Mishra G. **Long term health outcomes after hysterectomy.** *Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) Annual Scientific Meeting*, Melbourne, VIC, 13 -16 October 2019.

Mishra G. **A life course approach to chronic disease in women.** *Jean Hailes Women's Health Symposium*, Canberra, ACT, 22 -23 October 2019.

Mishra G. **Visualisation and modelling changes in categorical variables in longitudinal studies.** *Norwegian Epidemiological Association*, Oslo, Norway, 13 -14 November 2019.

Mishra G. **A life course approach to women's health** (Plenary speaker). *2019 International Conference for Intelligence and Big Health*, Zhejiang University & the Second Affiliated Hospital of Zhejiang University School of Medicine, Hangzhou, China, 5 – 8 December 2019.

Moran LJ, Brown WJ, McNaughton S, Joham AE & Teede HJ. **Weight management practices associated with polycystic ovary syndrome and their relationships with diet and physical activity.** *Australian New Zealand Obesity Society – Australasian Society for Lifestyle Medicine – International Chair on Cardiometabolic Risk (ANZOS-ASLM-ICCR) Joint Conference on Obesity and Related Chronic Diseases 2019*, Sydney, NSW, 16-18 October, 2019.

Moss K, Dobson A & Mishra G. **Is pregnancy a sensitive period? Testing competing explanations of the association between maternal depression and child behaviour and development.** *Developmental Origins of Health and Disease Conference*, Melbourne, VIC, 20-23 October 2019.

Moss K. **Mothers and their Children's Health (MatCH) study: Is pregnancy a sensitive period?** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019*, Brisbane, QLD, 23-25 October 2019.

Moss K. **A new method for investigating associations between play equipment and physical activity.** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019*, Brisbane, QLD, 23-25 October 2019.

Munk N, Steel A, Wardle J, Adams J, Sibbritt D & Lauche R. **Generational differences in young women's complementary medicine use motivators: Analysis of data obtained from Australian Longitudinal Study on Women's Health.** *14th International Congress on*

Complementary Medicine Research 2019, Brisbane, QLD, 7 - 10 May 2019.

Peeters G, van Schoor N, Cooper R, Tooth L & Kenny RA. **Prevalentie van vallen bij volwassenen van middelbare leeftijd: Moeten preventieve maatregelen al voor de 65 beginnen?** *Geriatriedagen 2019*, Hertogenbosch, The Netherlands, 7-8 February 2019.

Rahman M & Byles JE. **Trajectories of long-term care needs among older Australian women in RAC.** *American Geriatrics Society Annual Scientific Meeting*, Portland, Oregon, USA, 2 - 4 May 2019.

Rahman M & Byles JE. **Trajectories of older Australian woman in the residential settings: A multi-trajectories modelling approach** (poster presentation). *American Geriatrics Society Annual Scientific Meeting*, Portland, Oregon, USA, 2 - 4 May 2019.

Rahman M, Byles JE, Holliday E. **Association between patterns of community care use and RAC admission.** *52nd AAG Conference*, Sydney, Australia, 5 - 8 November 2019.

Schoenaker D, Mishra G & Callaway L. **How do women's adverse childhood experiences influence their risk of developing gestational diabetes: Findings from an Australian population-based study.** *11th DOHaD World Congress*, Melbourne, VIC, 20 - 23 October 2019.

Sexton C, Lalloo R & Mishra G. **Considerations for the analysis of longitudinal data.** *International Association for Dental Research Asia Pacific Region (IADR-APR) 2019*, Brisbane, QLD, 28 - 30 November 2019.

Shebeshi D. **Modelling unplanned and planned hospitalisation incident (2001-2016) in older Australian women aged 75 years and above: In the presence of death as a competing event.** *6th African International Conference (AIC) on Statistics*, Adama, Ethiopia, 27 - 30 May 2019.

Shehzad S, Byles JE, Nair K, Majeed T, Weaver N. **Atrial fibrillation – Medication patterns in older women in Australia.** *52nd AAG conference*, Sydney, Australia, 5 - 8 November 2019.

Thapaliya K, Byles JE, Harris M. **Prevalence of drugs use before and after dementia diagnosis.** *52nd AAG conference*, Sydney, Australia, 5 - 8 November 2019.

Thong E. **Contemporary risk of menstrual and reproductive dysfunction in women with Type 1 diabetes: A population-based study.** *AEPCOS Society Update, ENDO 2019*, New Orleans, USA, 23 - 26 March 2019.

Thong E. **Associations between reproductive factors and bone health in women with Type 1 diabetes: A 15-year longitudinal study (poster).** *World Congress on Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (WCO-IOF-ESCEO) 2019*, Paris, France, 4 - 7 April 2019.

Tooth L. **Understanding maternal preconception weight trajectories and child outcomes using a cohort-within-cohort study design.** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019*, Brisbane, QLD, 23 - 25 October 2019.

Tooth L. **From childcare to elder care: Challenges for women caregivers in rural areas.** *15th National Rural Health Conference*, Hobart, TAS, 24 - 27 March 2019.

Tooth L. **How adherence to Australian screen time guidelines differs by age in Australian children aged 0 to 12 years.** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019*, Brisbane, QLD, 23 - 25 October 2019.

Torquati L, Mielke Gregore I, Kolbe-Alexander T & Brown WJ. **Energy balance and occupational activity as predictors of obesity risk in women.** *Federation of European Nutrition Societies Conference (FENS) 2019*, Dublin, Ireland, 15 - 18 October 2019.

Waller M. **Using linked data to identify dementia records from the Australian Longitudinal Study on Women's Health.** *NNIDR Australian Dementia Forum*, Hobart, TAS, 13 - 14 June 2019.

Townsend N. **Is social media a useful tool or an accident waiting to happen? Risk, risk aversion and benefits of social media in longitudinal research.** *European Survey Research Association Conference*, Zagreb, Croatia, 15 - 19 July 2019.

Zhu D. **Age at natural menopause and risk of incident cardiovascular disease.** *Australasian Epidemiological Association (AEA) Annual Scientific Meeting 2019*, Brisbane, QLD, 23 - 25 October 2019.

Seminars and Workshops

Byles J. **Longevity and healthy aging among women in Australia.**

Healthy ageing – A lifelong process. AAG Hunter Chapter Seminar, Hunter Medical Research Institute, Newcastle, NSW, 15 March 2019.

Byles J, Princehorn E, Rahman M. **ALSWH Aged Care submission to Royal commission.**

International Longevity Centre Global Alliance Symposium, The Benevolent Society, Sydney, NSW, 5 November 2019.

Kanesarajah J. **Multimorbidity: Prevalence, associations with HrQoL and prevention.**

Seminar, Centre for Longitudinal and Life-course Research, The University of Queensland, Brisbane, QLD, 11 April 2019.

Kanesarajah J. **Prevalence, associations with HrQoL and health service use**

Statistical Society Australia-Queensland Branch Meeting, Brisbane, QLD, 7 May 2019.

Loxton D. **Women and violence across the life course**

Australian Institute of Health and Welfare. Canberra, ACT, February 2019.

Loxton D. **Women and Violence across the Life course.**

Inequality and Health Group, Hunter Medical Research Institute, Newcastle, NSW, June 2019.

Mishra G. **Fertility: Insights from the Australian Longitudinal Study on Women's Health.**

The Center for Fertility and Health at the Norwegian Institute of Public Health, Oslo, Norway, 15 November 2019.

Schoenaker D. **The role of nutrition before and after pregnancy in the prevention of adverse health outcomes for women and children.**

Seminar, Faculty of Medicine, University of Southampton, Southampton, UK, 18 December 2019.

Submissions

Queensland Parliament Health and Wellbeing Queensland Bill 2019- to establish a health promotion agency, Health and Wellbeing Queensland (HWQ)

Submitted: March 2019

The ALSWH submission noted the wealth of longitudinal data available from ALSWH on a wide range of variables, including sociodemographic and lifestyle factors, physical and mental health symptoms, diagnoses, and access to, and use of, health services. The availability of linked data on health service use by Queensland women was noted as providing a rich and unique opportunity to inform policy for the state.

Productivity Commission of Inquiry into Mental Health

Submitted: April 2019.

Our submission presented an overview of findings and policy recommendations from ALSWH regarding mental health and health and productivity outcomes, based on the 2019 report 'Policy Briefs from the Australian Longitudinal Study on Women's Health' prepared for the Australian Government Department of Health.

Food Standards Australia and New Zealand (FSANZ) Proposal P1050 – Pregnancy warning labels on alcoholic beverages

Submitted: October 2019.

Full details of submissions are available on the Study website.

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 5 of the 1989-1995 cohort
- Surveys 1 to 7 of the 1973-1978 cohort
- Surveys 1 to 8 of the 1946-1951 cohort
- Surveys 1 to 6 of the 1921-1926 cohort, along with the incomplete data from the six-month follow up survey of the 1921-1926 cohort.

In 2019, recent data from the six-month follow up survey of the 1921-1926 cohort were archived.

Enquiries

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A detailed description of the background, aims, themes, methods, and representativeness of the sample and progress of the study is given on the Study 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.