15th October 2020

Public Health - Plenary 1
3:00PM - 4:00PM
Chair: Rachael Taylor

3:00 PM Aiden Doherty
Reproducible machine learning of physical activity and sleep from wearable
sensor datasets to advance our understanding of obesity. abs# 1

Clinical - Plenary 2
3:00PM - 4:00PM
Chairs: Jerry Greenfield & Dorit Samocha-Bonet

3:00 PM Sadaf Farooqi
Obesity: from genes to behaviour abs# 2

Basic Science - Plenary 3
3:00PM - 4:00PM
Chairs: Sharon Ladyman & Josephine Yu

3:00 PM Fiona Gribble
Enteroendocrine cells - chemosensors of the postprandial state abs# 3

Public Health - Oral Abstracts 1
4:10PM - 5:10PM
Chair: Belinda Morley

4:10 PM Jenny Atkins
Tackling the issue of sugary drinks: 2013-2020 abs# 4

4:20 PM Belinda Morley
Utility of the 13 Cancers campaign linking sugary drinks, unhealthy
weight and cancer risk abs# 5
4:30 PM **Ashleigh Haynes**  
Sugary drink advertising expenditure in Australian media between 2016 and 2018 *abs# 6*

4:40 PM **Miranda R Blake**  
Favourable commercial and health behavior impacts of a healthy vending policy at an Australian university *abs# 7*

4:50 PM **Maree Scully**  
Can point-of-sale nutrition information promote healthier drink choices among teens? *abs# 8*

5:00 PM **Claudia Gascoyne**  
Secondary school canteens in Australia: analysis of canteen menus from a repeated cross-sectional national survey *abs# 9*

**Clinical - Oral Abstracts 2**

4:10PM - 5:10PM

Chair: Priya Sumithran

**Session sponsored by**

4:10 PM **Rebecca F Goldstein**  
A Pragmatic Lifestyle Intervention in Obese Pregnant Women to Limit Gestational Weight Gain: The Healthy Pregnancy Project *abs# 10*

4:20 PM **Lijun Zhao**  
Eating patterns in adults with obesity: associations with body fat and glycaemic control *abs# 11*

4:30 PM **Andrea L Pattinson**  
Diet quality following meal replacement versus food-based weight loss diets in postmenopausal women with obesity: a secondary analysis of The TEMPO Diet Trial *abs# 12*

4:40 PM **Isabel E Young**  
Improving weight bias internalisation in young women with obesity – The everyBODY Pilot Study *abs# 13*

4:50 PM **Belinda Coldebella**  
A need for multidisciplinary healthcare support - the discrepancy between patient needs and contemporary Australian bariatric surgery healthcare *abs# 14*
5:00 PM **Kathryn Williams**
Three “Ds” – Elements for Successful Weight Loss Outcomes: Role of Healthcare Professionals *abs# 15*

**Basic Science - Oral Abstracts 3**

4:10PM - 5:10PM

Chairs: Maria Nunez-Salces & Sarah-Jane Leigh

4:10 PM **Diana Sketriene**
Investigating the impact of intermittent versus *ad libitum* access to high-fat high-sugar food on cognition, social interaction, sleeping patterns and food-seeking behaviour. *abs# 16*

4:20 PM **Therese Freire**
You are what you mother eats: Maternal macronutrient intake and the effects on offspring metabolism and behaviour *abs# 17*

4:30 PM **Sarah-Jane Leigh**
Oral nicotinamide mononucleotide and exercise exert unique and additive effects on the gut microbiome of high-fat diet-fed mice *abs# 18*

4:40 PM **Josephine Yu**
Betaine supplementation augments the beneficial effects of exercise on glucose handling in a mouse model of diet-induced obesity. *abs# 19*

4:50 PM **William De Nardo**
Exercise responsive hepatokines and the modulation of glycemic control *abs# 20*

5:00 PM **Hamzeh Karimkhanloo**
Circulating Cathepsin S improves glycemic control in mice *abs# 21*

**COVID-19 & Obesity Cross Cutting Symposia**

5:20PM - 6:40PM

Chairs: Caroline Miller & Brian Oldfield

5:20 PM **Tim Spector**
COVID-19 and Diet *abs# 22*

5:40 PM **Linda Bauld**
Aligning communicable and non-communicable disease prevention: how the Covid-19 crisis in the UK might progress a healthy weight strategy *abs# 23*

6:00 PM **Christos Kyratsous**
Rapid selection, characterization and clinical development of fully-human antibodies against emerging infectious diseases *abs# 24*
Presentations will be followed by a live Q&A with Tim Spector, Linda Bauld and S.S. Vasan

ANZOS e-Posters

3:00PM - 6:00PM

**Benjamin P Larkin**
The effect of low-dose hydralazine on obesity-related chronic kidney disease  *abs# 101*

**Abdelaziz Ghanemi**
Exercise and High-Fat Diet in Obesity: Functional Genomics Perspectives of Two Energy Homeostasis Pillars  *abs# 102*

**Abdelaziz Ghanemi**
Secreted Protein Acidic and Rich in Cysteine: Metabolic and Homeostatic Properties beyond the Extracellular Matrix Structure  *abs# 103*

**Abdelaziz Ghanemi**
Broken Energy Homeostasis and Obesity Pathogenesis: The Surrounding Concepts  *abs# 104*

**Heidi Morahan**
Metabolic and behavioural effects in offspring exposed to maternal sucrose consumption: A systematic review and meta-analysis of data from rodent models  *abs# 105*

**Abdelaziz Ghanemi**
Energy metabolism in trefoil factor family member 2 (Tff2) KO mice beyond the protection from high-fat diet-induced obesity  *abs# 106*

**Natassia Rodrigo**
The effect of preconception vs intrapartum weight modulation strategies on maternal metabolic outcomes and metabolic inflammation in late gestation mice  *abs# 107*

**Claire Rennie**
BSA as a potential therapeutic for obesity  *abs# 108*

**Heidi Morahan**
Male rats consume commercial beverages sweetened with non-nutritive sweeteners. An ecological study in rodent models.  *abs# 109*

**Rebecca Mathews**
Outcomes and predictors of success for very low energy diet from Canberra obesity management service  *abs# 111*

**Abdelaziz Ghanemi**
Classifying obesity as a disease requires its redefinition  *abs# 112*

**Angela Blair**
Blood Glucose Monitoring Practices of People with Diabetes  *abs# 113*
Kai Liu
Intermittent fasting increases growth differentiation factor 15 in comparison to energy-matched daily calorie restriction in females with overweight or obesity abs# 114

Natika Deavin
Use of partial meal replacement in class 3 obesity in an Australian public weight management program abs# 115

Sophie Kobuch
Obstructive sleep apnoea does not affect weight loss at 12 months in patients with class 3 obesity - a retrospective study from an Australian publicly funded weight management program abs# 116

Divya Ramachandran
Impact of COVID-19 restrictions on self-managed weight-loss journeys abs# 117

Zanab Malik
Dental utilisation, body mass index and oral and general health variables in those with clinically severe obesity: a survey-based cohort study abs# 118

Rajesh Chaudhary
Effect of caloric restriction and intermittent fasting on the anti-inflammatory and cholesterol efflux properties of HDL-c in a randomised controlled trial abs# 119

Marco Ip
The nexus between nature and nurture to address picky eating in Australian children. abs# 120

Hiba Jebeile
Adolescents, Instagram and #weightloss: what makes a popular post? abs# 122

Ana Maria Contardo Ayala
The associations between sitting, standing, stepping time, and breaks from sitting and cardiometabolic health markers among children. abs# 123

Miaobing Zheng
Longitudinal associations between changes of sleep duration and body mass index in early childhood abs# 124

Adrian J Cameron
Combined Influence of Waist and Hip Circumference on Risk of Death in a Large Cohort of European and Australian Adults abs# 125

Helen Skouteris
Preventing childhood obesity by focusing on a life course approach. The Health in Preconception and Pregnancy (HiPP) Centre of Research Excellence abs# 126

Seonad K Madden
The barriers and enablers affecting the healthy lifestyle behaviours, weight maintenance, and wellbeing of working women during preconception and pregnancy: a qualitative study using the COM-B model abs# 127
Joannah Braham
Enhancing self-efficacy to improve physical activity behaviours in adults with diabetes: evaluation of the Ready Set Go, Let’s Move! Program abs# 128

Claudia Gascoyne
Is food marketing on social media associated with dietary intake in Australian adolescents? Findings from a national cross-sectional survey abs# 129

Joe Carrello
Utility decrements associated with adult overweight and obesity in Australia: a systematic review and meta-analysis abs# 130

Claudia Gascoyne
Impact of COVID-19 on adults’ eating habits and physical activity to inform healthy lifestyle campaign messaging abs# 131

Abdelaziz Ghanemi
Will an obesity pandemic replace the coronavirus disease-2019 (COVID-19) pandemic? abs# 132

Briony Hill
A new Socio-Ecological Framework for Maternal Obesity Prevention abs# 133

Canaan Negash Seifu
Dietary patterns associated with obesity outcomes in adults: an umbrella review abs# 134

Rory van der Linden
Understanding the barriers to treating childhood obesity in Australian General Practitioners abs# 135

Linda Ferrington
Increasing confidence to treat childhood obesity: an interventional study of undergraduate medical students abs# 136

Briony Hill
The Health in Preconception, Pregnancy and Postpartum Early- and Mid-Career Researcher Collective: Achieving collective action for the prevention of maternal obesity abs# 137

Devorah Riesenberg
Customer and staff opinions and attitudes towards a healthy beverage intervention in sport and recreation facilities in Victoria, Australia abs# 138

Alice Pryor
Health communication in a pandemic: achievements and learnings abs# 139

Chloe Groves
Longitudinal analysis of overweight and obesity in children and adolescents abs# 140

Chris E Vavakis
Addressing childhood obesity in regional Western Australia – An innovative approach. abs# 141
Cervantée EK Wild
Challenges of making healthy lifestyle changes for families in Aotearoa New Zealand: why prevention and intervention must work together abs# 142

Kylie E Hunter
Forming a global repository of trials to transform early childhood obesity prevention interventions abs# 143

James Stevens-Cutler
Adapting the LiveLighter message to support people at home during COVID-19 abs# 144

Katie Allison
Assessing the acceptability and barriers to digital health education for culturally and linguistically diverse (CALD) communities, when designing effective digital education. abs# 145

Mamaru Awoke
Longitudinal weight gain and lifestyle factors in women with and without polycystic ovary syndrome abs# 146

Ellen Hart
The making of an ad – formative research to inform the LiveLighter® campaign abs# 147

Emily You
The Life! program: effective in improving behavioural, physical and bio-medical outcomes, and reducing diabetes and cardiovascular disease risk factors abs# 148

Vicki Brown
Cost-effectiveness of an intervention to reduce children’s sedentary time and increase physical activity: the Transform-Us! cluster RCT abs# 149

Yoko B. Wang
Association between dietary inflammatory index, dietary patterns, plant-based dietary index and the risk of obesity in Australian adults abs# 150

Pragya PK Kandel
Enablers and barriers to women’s lifestyle behaviour change during the preconception period: A systematic review”. abs# 151

Heidi J Bergmeier
Interrelated factors of disordered eating and obesity in pregnancy and postpartum and implications for early parenting abs# 152

Ninoshka J D’ souza
Longitudinal trends in behavioural profiles and adiposity in school children abs# 153

Huong Ngoc Quynh Tran
A systematic review of economic evaluations of health-promoting retail-based interventions abs# 154

Liyuwork M Dana
Meals ordered online for delivery and other lifestyle behaviours during the COVID-19 abs# 155
Melissa M Lane
Ultra-processed food and chronic non-communicable diseases: A systematic review and meta-analysis of 43 observational studies abs# 156

Jacqueline L. Walker
Anatomy of Project ECHO® for preventing and treating childhood obesity in Queensland, Australia. abs# 157

MAUREEN MAKAMA
Patterns of change in lifestyle behaviours following childbirth abs# 158

Sarah Marshall
Feasibility of culturally adapting the Healthy Beginnings program for early obesity prevention abs# 159

Tara Boelsen-Robinson
“It defeats the purpose of what sport is all about”: perspectives on fast food, gambling, and alcohol sponsorship in elite sport from Australian sporting fans abs# 160

16th October 2020

Clinical - Plenary 4
11:00AM - 12:00PM
Chairs: Leonie Heilbronn & Amy Hutchison

11:00 AM Kevin Hall
Calories, Carbs, or Quality? What Matters Most for Body Weight abs# 25

Paediatrics - Plenary 5
11:00AM - 12:00PM
Chairs: Shirley Alexander & Hiba Jebeile

11:00 AM Tom Robinson
Stealth Interventions for long-term behavior change abs# 26

Public Health - Plenary 6
12:10PM - 1:10PM
Chair: Jane Martin

12:10 PM Cliona Ni Mhurchu
A Co-Designed mHealth Programme to Support Healthy Lifestyles in Māori and
Basic Science - Plenary 7
12:10PM - 1:10PM

Chairs: Amanda Page & Bo Liu

12:10 PM **Satchin (Satchidananda) Panda**
Sex and age-dependent outcomes time-restricted feeding of a high-fat high-sucrose diet in rodents *abs# 28*

Clinical - Oral Abstracts 4
1:20PM - 2:20PM

Chair: Kai Liu

Session sponsored by *novo nordisk*

1:20 PM **Janet Franklin**
A survey of mood and behaviours of patients attending a tertiary weight loss clinic during the Covid-19 pandemic *abs# 29*

1:30 PM **Alyssa Susanto**
The relationship between gender and weight loss outcomes in Australian overweight or obese adults with prediabetes: an analysis of the PREVIEW study *abs# 30*

1:40 PM **Ritesh Chimoriya**
Improvement in quality of life, psychological distress and eating disorder risk in people with class 3 obesity in an Australian multidisciplinary weight management program *abs# 31*

1:50 PM **Lucinda Blackshaw**
Barriers and facilitators to the implementation of lifestyle management in Polycystic Ovary Syndrome: Endocrinologists’ and Obstetricians and Gynaecologists’ perspectives *abs# 32*
2:00 PM **Shelley E Keating**  
The efficacy of high-intensity interval training on peripheral insulin resistance, cardiometabolic risk and quality of life in non-alcoholic steatohepatitis: a pilot randomised controlled trial *abs# 33*

2:10 PM **Priya Sumithran**  
Chicken or the egg: confidence and motivation in people with successful weight loss *abs# 34*

**Paediatrics - Oral Abstracts 5**

1:20PM - 2:20PM

Chair: Natalie Lister

1:20 PM **Li Kheng Chai**  
Health practitioners’ perspectives on telehealth for childhood obesity treatment: a focus group study *abs# 35*

1:30 PM **Alison Hayes**  
The solution to childhood obesity lies in sustained interventions: modelling study *abs# 36*

1:40 PM **Benjamin J Varley**  
Higher prevalence of autonomic neuropathy in youth with type 2 vs type 1 diabetes *abs# 37*

1:50 PM **Megan L Gow**  
Increased growth trajectories of Australian infants exposed to preeclampsia *abs# 38*

2:00 PM **Shelley E Keating**  
Associations between body adiposity, aerobic and anaerobic capacity, and physical activity levels in pre-school aged children with typical and atypical neurodevelopment: results from the CATCH cohort study *abs# 39*

2:10 PM **Huong Ngoc Quynh Tran**  
Cost-effectiveness of scaling up a whole of community intervention to prevent obesity in pre-schoolers nationally: the Romp & Chomp early childhood obesity prevention intervention *abs# 40*

**Public Health - Oral Abstracts 6**

2:30PM - 3:30PM

Chair: Ainslie Sartori
2:30 PM **Chloe Groves**  
Overweight and obesity in Australia by birth cohort, 1995, 2007–08 and 2017–18 *abs# 41*

2:40 PM **Cervantée EK Wild**  
Health system barriers to accessing care for children with weight issues *abs# 42*

2:50 PM **Thomas Laing**  
12-month follow up of the Beat It program, an 8-week community-based group exercise and lifestyle program for people with diabetes *abs# 43*

3:00 PM **Tegan Nuss**  
Australians’ support for initiatives to protect children from digital marketing of unhealthy food and drink products *abs# 44*

3:10 PM **Ainslie Sartori**  
Building the case for removing junk food ads from State-owned assets in Western Australia *abs# 45*

3:20 PM **Helen Dixon**  
An experimental comparison of walking time & Health Star Rating labels on product perceptions and preferences *abs# 46*

**Basic Science - Oral Abstracts 7**

2:30PM - 3:30PM

**Chairs:** Maria Nunez-Salces & Sarah-Jane Leigh

2:30 PM **Carsten Schmitz-Peiffer**  
Protein kinase C epsilon affects glucose homeostasis in fat-fed mice through actions in multiple tissues *abs# 47*

2:40 PM **Geke Aline Boer**  
The effect of GIP receptor knockout on lipid- and whole-body metabolism in HFD-fed mice. *abs# 48*

2:50 PM **Neda Rafiei**  
Effect of chemogenetic neuropeptide Y neuron activation in the central amygdala on the modulation of energy homeostasis and macronutrient preference *abs# 49*

3:00 PM **Tara-Lyn Camilleri-Carter**  
Parental diet effects and lifespan in *Drosophila* *abs# 50*

3:10 PM **Sean M Lanting**  
Cutaneous microvascular dysfunction is associated with obesity severity and adiposity in adults with type 2 diabetes *abs# 51*

3:20 PM **Shelley Gorman**  
Harnessing ultraviolet light to reduce metabolic dysfunction *abs# 52*
Young Investigator Award and ANZOS AGM

3:40PM - 4:40PM

Chair: Tim Gill

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Reproducible machine learning of physical activity and sleep from wearable sensor datasets to advance our understanding of obesity.

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Much uncertainty exists on whether obesity is a determinant of physical activity, or vice-versa. For example, it is difficult to conduct high quality randomised controlled trials due to ascertainment bias where it is impossible to blind participants to behavioural interventions. In addition, observational studies are prone to reverse causation, residual confounding, and have relied on self-reported measurements of physical activity that are crude and unreliable. However, large biobank studies now contain data on genetics and objective device-based measurements of physical activity status. Human genetic approaches could provide evidence to determine whether genetically determined differences in device-measured physical activity might causally influence obesity.

My group has worked closely with UK Biobank to measure physical activity status in ~100,000 participants who agreed to wear a wrist-worn device for seven days. These measurements are now actively used by health researchers worldwide to demonstrate associations between physical activity and disease outcomes. Machine learning methods can help maximise the utility of data from wearable sensors. However, there is a broad concern around the lack of reproducibility of machine learning models in health data science. It is critical to carefully consider how to promote robust machine learning findings and reject irreproducible ones, to ensure credibility and trustworthiness.

In this talk I will share my group’s work on reproducible machine learning of sleep and physical activity behaviours from wearable sensor data. I will then illustrate the genetic architecture of these measurements and show that activity and adiposity share a bi-directional relationship. Finally, I will discuss the opportunities for wearable sensors to advance our understanding of obesity and its associated morbidities.
Tackling the issue of sugary drinks: 2013-2020

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Background

LiveLighter® is a healthy lifestyle campaign funded by the WA Department of Health and implemented by Cancer Council WA. It aims to reduce the rates of overweight and obesity amongst WA adults through hard-hitting TV-led public education campaigns, community-based strategies, research, public relations activities and advocacy. From 2013-2020 the campaign has urged Western Australians to reduce their sugary drink consumption, tackling traditional sugar-sweetened beverages (SSB) and evolving campaign messaging to target popular slushies, cancer risk and tooth decay.

Methods

A combination of TV and non-TV campaigns have been used to address the issue; including:

• ‘Sugary Drinks’ (TV) focused on SSB’s and ‘toxic fat’
• ‘Don’t Be Sucked In’ (non-TV) addressed discounted frozen slushie promotions during summer
• ‘13 Cancers’ (TV) linked SSB’s, unhealthy weight and cancer risk
• ‘Sugary Drinks are a Rotten Choice’ (non-TV) was a partnership with the Australian Dental Association (WA) about tooth decay, calling for restrictions on the promotion and availability of SSBs.

Results

Evaluation found adults that report drinking SSBs one or more times per week decreased from 60% at baseline (2012) to 41% in 2019. Additionally, SSB consumption among Western Australian teenagers showed steeper declines (cf. all other states combined) from 20% to 10% between 2012-13 and 2018, coinciding with the first airing of LiveLighter® ‘Sugary Drinks’. (National Secondary Students’ Diet and Activity survey). This indicates the public are receptive to making simple lifestyle changes suggested by the LiveLighter® advertising. Furthermore, evaluation has shown community support for measures to reduce the availability of SSBs to children and adults.

Conclusions

LiveLighter® has shown it is possible to maintain consumer interest and acceptance of a single key issue over time. Adapting campaign messaging and media advertising strategies can result in positive behaviour changes, as well as increasing community support for policy measures that create healthier environments.

Utility of the 13 Cancers campaign linking sugary drinks, unhealthy weight and cancer risk

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Background: The 13 Cancers mass media campaign aimed to highlight the link between being above a healthy weight and increased risk of thirteen types of cancer, to motivate Victorians to avoid sugary drinks to help achieve/maintain a healthy weight. Aired in October 2019, wave two of the television-led campaign targeted 25-54 year-olds (primary audience) with supporting digital media aimed at 18-24 year-olds (secondary audience). Evaluation assessed awareness and impact among these target groups.

Methods: Post-campaign cross-sectional design with a comparison group. Population surveys were undertaken with 947 respondents aged 18-59 in Victoria (campaign state) and 1,170 in all other Australian states, excluding WA (non-campaign states). Respondents were from a national probability-based online panel (n=667) and a non-probability panel (n=1,450) and blended using calibration weighting. Multivariable logistic regression models were tested.

Results: Just over half of Victorians in both audience groups were aware of the campaign. Victorians’ knowledge of the link between overweight and cancer was greater than the comparison states in the primary target audience (p<0.05), including among those with overweight BMI (25+) (p<0.001) and parents (p<0.01). Perceived urgency to reduce sugary drink consumption was also greater among the primary audience (p<0.05), particularly frequent consumers (p<0.01). Young adults showed stronger intentions to reduce consumption of soft drinks and energy drinks (both p<0.05). While flavoured mineral water consumption was greater overall (p<0.05), results showed fewer frequent sugary drink consumers among primary audience BMI 25+ respondents in the campaign state (p<0.05). Support for taxing sugary drinks was also higher among Victorians in the primary audience with BMI 25+ (p<0.05).

Conclusions: Findings provide additional evidence of the utility of a mass media campaign to influence knowledge and behavioural intentions regarding sugary drink consumption, unhealthy weight and cancer risk and add further support for mass-reach multi-media campaigns as a strategy for obesity prevention.

Sugary drink advertising expenditure in Australian media between 2016 and 2018
Favourable commercial and health behavior impacts of a healthy vending policy at an Australian university

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Aim: To determine the health behavior and commercial outcomes of a healthy vending policy implemented as one part of a holistic university food policy.

Methods: A quasi-experimental design evaluated a multi-component policy implemented across four university campuses in Victoria, Australia in April 2017. Maximum possible IQ was calculated against a modified Traffic Light Framework. Policies included (i) display ≤20% ‘red’ beverages and ≥50% ‘green’ beverages; (ii) machine traffic light labelling; (iii) health-promoting machine branding; (iv) review of machine placement; and (v) recycled bottle packaging. Monthly electronic sales data were collected from 51 beverage vending machines from January 2016 (27 months pre-policy) to December 2019 (21 months post-policy). Interrupted time series analysis of sales data compared ‘red’, ‘amber’, and ‘green’ beverage volume sales, and revenue post-policy to predicted sales.

Results: By the 21st month post-policy implementation, there was a 112.5% [95% CI: 23.5, +201.6] increase in total beverage volume sold and a 100.4% [+33.1, +167.6] increase in revenue. There was no change in ‘red’ beverage volume sold, but increases in ‘green’ (+119.7% [33.9, +205.5]) and ‘amber’ (+209.1% [+5.7, +412.5]) volume sold.

Conclusions: This study is the longest follow-up of a beverage vending intervention to date. The sustained health behavior and commercial impacts of this multi-component policy at 21 months suggest that such vending interventions can be effective and sustainable in the medium-to-long term. While it is difficult to say to what extent the holistic approach contributed to the success of this real-world policy, it does provide a promising model to promote healthy food retail in vending and other contexts.

Can point-of-sale nutrition information promote healthier drink choices among teens?

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Aims: To examine whether point-of-sale (POS) information about the nutrition content of sugary drinks promotes healthier drink choices among teenagers, and explore whether impacts of POS information on consumer drink choices vary based on self-reported prior exposure to a sugary drink public health campaign (13 Cancers).

Methods: Australian teenagers aged 13 to 17 years (N=925) were recruited from an online panel (via their parents) and randomly assigned to one of three POS signage conditions: no signage (control); sugar content; Health Star Rating (HSR). Participants viewed their randomly assigned POS sign on screen alone, then alongside a drinks product display and were asked to select which drink they would choose to buy for themselves. Following this task, participants completed ratings of their perceptions of various drink products before being shown the 13 Cancers video advertisement to assess prompted recall of the campaign.

Results: Exposure to POS signage did not promote a significant reduction in the proportion of teenagers who selected a sugary drink compared to seeing no sign. Participants’ cognitive and emotional responses to the POS signage were strongest for the sugar content sign, with this sign rated higher than the HSR sign on a number of perceived effectiveness measures (e.g. made a strong argument, made me stop and think). In addition, participants in the sugar content condition rated sugary drinks...
as less healthy (cf. control condition) and were more likely to accurately estimate the number of teaspoons of sugar in a bottle of soft drink (cf. HRS sign and control conditions). Self-reported prior exposure to the 13 Cancers campaign did not appear to influence participants’ responses.

**Conclusions:** Testing of these POS signs in real-world retail settings is needed to determine whether educational impacts extend to promoting healthier drink purchases and consumption among youth.

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**Secondary school canteens in Australia: analysis of canteen menus from a repeated cross-sectional national survey**

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Background and aims: The National Healthy School Canteen Guidelines were established in 2010 to improve the overall nutritional quality of foods sold in Australian school canteens. Individual states and territories have adapted these guidelines in region-specific school food policies. This study aimed to assess the nutritional quality of Australian secondary school canteen menus using a ‘traffic light’ classification system against the national guidelines. Methods: Stratified national samples of schools provided canteen menus in 2012-2013 (n = 148) and 2018 (n = 96). Menu items (n = 21,501) were systematically classified by trained research assistants as green (healthiest and recommended to dominate canteen menus), amber (select carefully), or red (low nutritional quality and not recommended to appear on canteen menus). Pricing and promotional strategies were also recorded. Results: Forty-nine percent of canteen menus contained at least 50% green items, in line with national guidelines. However nearly all (98.5%) offered at least one red item, and therefore did not fully comply with the guidelines. Snacks and drinks were the least healthy item category and cold meal items were the healthiest. A large proportion of schools supplied products typically of poor nutritional quality (meat pies and savoury pastries 91.8%, sugary drinks 89.5%, sweet baked goods 71.5%, ice-creams 64.1%, potato chips 44.0%). On average, menu items classed as ‘red’ were significantly cheaper than green items, and around half the schools promoted red items on canteen menus (52.8%). There were few differences between survey waves. Conclusion: The results from these national samples of secondary schools indicate there is considerable room for improvement in the nutritional quality of canteen menus in schools, including in the availability, pricing, and promotion of healthier options. Additional resources and services to support implementation of national guidelines would be beneficial.

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**A Pragmatic Lifestyle Intervention in Obese Pregnant Women to Limit Gestational Weight Gain: The Healthy Pregnancy Project**

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Background: Excess gestational weight gain (GWG) is common and has adverse maternal and infant outcomes including increased gestational diabetes. This trial aimed to demonstrate effectiveness of lifestyle intervention on reducing excess GWG and to explore implementation across intervention uptake and adherence in routine care.

Methods: This pragmatic controlled implementation-effectiveness trial was conducted in a tertiary hospital maternity service. Participants included women with pre-pregnancy BMI of 35-49kg/m² at risk of excess GWG, recruited before the 23rd week of gestation. The intervention group attended routine antenatal care with an integrated behavioural lifestyle intervention delivered by a health coach and an endocrinologist in a total of five visits. Women who developed endocrine complications (gestational diabetes, thyroid disease) were treated within the service, simplifying their treatment plan. The comparison group was existing standard of care.

Results: 277 women were studied: 157 in intervention, 120 in standard care. The intervention did not result in a difference in proportion of women who gained excessive GWG above IOM recommendations, 32% of intervention and 33% of standard care exceeding (p=0.91). There was a reduction in total GWG (~1.4 (95% CI -2.6, -0.1), p=0.04 adjusted bootstrap), also significant when excluding for women who developed GDM (~2.0 (95% CI -4.0, -0.2), p=0.03 adjusted). Mean GWG/week was also lower in intervention group (0.32kg/week vs 0.37 kg/week, p=0.02, adjusted). Intervention uptake was 95% and 87% attended 4 of 5 sessions.

Conclusion: Lifestyle intervention embedded in routine antenatal care for obese women lowered total GWG and GWG/week, although the proportion of pregnancies with excessive GWG was similar in both groups. Intervention uptake and engagement rates were high. This pragmatic trial of lifestyle implementation into pregnancy care is important in the context of new national guidelines recommending GWG control. Lower intensity intervention studies for non-obese women are underway across multiple services, states and countries, as are cost-effectiveness analyses.

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**Eating patterns in adults with obesity: associations with body fat and glycaemic control**
Diet quality following meal replacement versus food-based weight loss diets in postmenopausal women with obesity: a secondary analysis of The TEMPO Diet Trial

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Introduction: Severely energy-restricted diets which utilise meal replacement products are the most effective dietary obesity treatment (1, 2). However, there are concerns they may fail to educate individuals on adopting a healthy food-based diet after weight loss (3). This study compares changes in diet quality following meal replacement versus food-based weight loss diets.

Methods: 79 postmenopausal women with obesity, aged 45 to 65 years, were randomised to either a moderately energy-restricted food-based diet modelled on the Australian Dietary Guidelines for 12 months, or a severely energy-restricted total meal replacement diet for 4 months, followed by the moderate diet until 12 months. Participants completed 7-day estimated food records at baseline and 12 months. Diet quality was scored using the Healthy Eating Index for Australian Adults (4).

Results: Overall diet quality improved from baseline in both groups, but more so in the food-based group, with a mean increase of 11.8 (13.9) versus 3.6 (10.8) points in the meal replacement group (p=0.004). This difference between groups was driven by a greater increase in fruit intake and a greater reduction in discretionary food intake in the food-based group (0.2 (0.6) versus -0.2 (0.9) serves per day, p=0.005; -3.0 (2.5) versus -1.8 (2.5) serves per day, p=0.03, respectively). There were no differences between groups for change in intake of any other of the dietary components investigated (p>0.05). Despite improvements, dietary intake was still outside the Australian Dietary Guidelines’ recommendations for both groups.

Conclusion: Diet quality improves somewhat following dietary weight loss interventions that are either based on food or that involve total meal replacement. It is important to address diet quality in dietary weight loss interventions, and meal replacement diets specifically stand to benefit from attention to adequate fruit intake, preferably at the expense of discretionary foods, upon transition to regular food.
Improving weight bias internalisation in young women with obesity – The everyBODY Pilot Study

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Background: Overweight and obesity effects 40% of young women, a vulnerable group who are often attracted to “quick-fix” diets which are unsustainable and driven by negative weight-based stereotypes. Weight bias internalisation (WBI) refers to internalising and applying these negative weight-based stereotypes to oneself and the associated devaluation of one’s social identity. WBI has been shown to negatively impact health and prevent long term weight-loss success. With few weight-loss interventions targeting WBI, this study aimed to determine if it could be improved in a tailored program for young women.

Methods: The study employed a two-arm quasi-experimental design with repeated measures. Healthy overweight and obese young women (BMI>25; 18-25y; n=53) first engaged in a standardised dietitian-led weight loss intervention, and then participated in one of two 12-week cognitive behavioural therapy (CBT) group programs which included SMS support. Participants randomised to the novel (“everyBODY”) arm (n=27) received a CBT intervention addressing body dissatisfaction and WBI. Participants randomised to the Standard Care arm (n=26) received CBT best practice care for weight management (which does not address WBI). This study examines data from Week 1 to Week 12.

Results: Retention at 12 weeks was 55%, and 26% of completers achieved >5% weight-loss. Participation in the everyBODY arm was associated with improvements in WBI, body attitudes, weight management self-efficacy and mood. Participation in the Standard Care arm was associated with improvements in weight and body attitudes. Both groups reduced binge eating.

Conclusion: Whilst both interventions had a positive impact on participants, albeit in different ways, this study demonstrates that a tailored psychological program can improve WBI in young women. There was an interesting but unexpected difference in weight loss between the two groups. A 12-month follow-up will examine if first improving WBI empowers young women to address long term weight loss and maintenance more effectively.

A need for multidisciplinary healthcare support - the discrepancy between patient needs and contemporary Australian bariatric surgery healthcare

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Introduction

There is evidence to suggest that bariatric surgery patients’ that receive healthcare support from a multidisciplinary team (MDT), achieve better weight and health outcomes following surgery, than individual that do not receive MDT support. However, there is currently a paucity of studies examining the patients’ experience of Australian bariatric healthcare services. The aim of this study was to explore the bariatric surgery patients’ perceptions and experiences of bariatric healthcare in Australia.

Methods

An online survey, hosted through Survey Monkey®, was made available to members of five popular Australian bariatric surgery social media groups. Survey questions gathered demographic data, details of pre and post-operative healthcare support, perceived barriers to accessing or receiving bariatric healthcare, and healthcare needs.

Results

A total of 518 respondents, aged 22 to 71 (93% Female), completed the survey. Participants were located across Australia, (21% NSW, 25% WA, 25% QLD, 20% VIC, 5% SA, 2% TAS, 1% ACT, 1% NT). Pre-operatively participants reported receiving healthcare support from the surgeon (63%) dietitian (78%), psychologist (34%) exercise specialist (14%) and bariatric GP (13%). Post-operatively (<12-months) participants reported receiving healthcare support from the surgeon (92%) dietitian (81%), psychologist (26%) exercise specialist (19%) and bariatric GP (27%). A total of 39% of participants in the sample reported that they would have liked more access to professional healthcare support. Support needs included: behavioural change (55%), emotional eating (48%), exercise (39%) diet (37%), managing weight re-gain (33%), weight maintenance (30%), and motivation (29%). Barriers to receiving or accessing services included: cost, travel, time, family commitments, and a lack of service availability.

Conclusion

This study provides valuable insight into the level of healthcare support Australian bariatric surgery patients are currently receiving. An MDT approach to bariatric surgery healthcare was found to be uncommon, and a number of important healthcare needs were identified.
Three “Ds” – Elements for Successful Weight Loss Outcomes: Role of Healthcare Professionals

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Background: In people with obesity (PwO), body weight loss of ≥5% is generally considered to be clinically meaningful. To identify aspects that might contribute to a successful weight loss outcome (WLO; ≥5% body weight loss maintained for ≥1 year), we investigated the characteristics and experience of PwO with and without successful WLOs using data from the ACTION-IO study.

Methods: An online survey was completed by PwO and HCPs in 11 countries: Australia, Chile, Israel, Italy, Japan, Mexico, Saudi Arabia, South Korea, Spain, UAE and UK. A successful WLO was defined as ≥5% body weight loss in the past 3 years maintained for ≥1 year.

Results: A total of 14,502 PwO completed the survey. General characteristics were similar between those who had a successful WLO (n=1,559; 11%) vs those without (n=12,943; 89%); 53% vs 52% were male; the mean age was 49 vs 48 years; the mean number of comorbidities was 2.0 vs 1.8. The mean number of serious weight loss attempts was 4 for both groups. However, more PwO who had a successful WLO weighed themselves every day (20%) compared with those who had not had a successful WLO (10%). In terms of interactions with HCPs, more PwO who had a successful WLO had discussed weight (58%) with an HCP within the past 5 years than those who did not have a successful WLO (53%). In addition, more PwO who had a successful WLO compared with those who did not had been diagnosed with obesity (42% vs 35%) and had subsequent direction through the scheduling of a follow-up appointment (25% vs 21%).

Conclusions: A 3D approach from HCPs (diagnosis, discussion and direction) appears to be a key element in facilitating a successful WLO. Neither gender, nor age, nor number of weight loss attempts was associated with a successful WLO.

Investigating the impact of intermittent versus ad libitum access to high-fat high-sugar food on cognition, social interaction, sleeping patterns and food-seeking behaviour.

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Intermittent access schedules model a common form of “yo-yo” dieting, whereby a person abstains from high-fat/high-sugar foods while trying to eat less energy dense, and often less palatable, foods. This cycling pattern of intake resembles the use-abstinence cycle observed in drug addiction and is a risk factor for the development of binge eating disorder and obesity. We were interested in determining the extent to which exposure to highly palatable diet affected a range of different behaviours including social interaction, cognition, sleep and food-seeking behaviour. Rats were exposed to high-fat high-sugar pellets in either an ad libitum (ad lib 24h/d) or intermittent (36h/1h) manner for a period of 10 weeks. A control group was given access to standard rodent diet only (ad lib, 24h/d). Cognition was assessed using a modified holes board test. Social interaction was assessed using the resident intruder test. Pattern of sleeping was monitored over a 24h period via video recording. Analysis is ongoing for these tests. Compulsive-like eating was assessed using a conditioned suppression paradigm. In this test rats were given the opportunity to eat highly palatable food for 30 min per day to establish their baseline intake, followed by 4 days of foot shock (0.5mA) paired with a light cue (CS) in the absence of food. During the test session on the following day the effect of CS exposure alone on high-fat high-sugar pellets consumption was assessed. Total food intake and latency to eat were reduced in ad lib (p<0.05) and chow (p<0.05) groups but was unchanged in intermittent group, demonstrating that their consumption was insensitive to aversive environmental cues predicting adversity. These findings suggest that an intermittent schedule of access to highly palatable diet is sufficient to promote compulsive-like eating behaviour in susceptible individuals thereby contributing to the development of obesity.
You are what you mother eats: Maternal macronutrient intake and the effects on offspring metabolism and behaviour

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Nutrition is the single most important modifiable factor that influences reproduction, health and the intergenerational risks of obesity and metabolic disease. It is well accepted that in utero exposure to maternal diet can program offspring body composition and susceptibility to disease in later life. While animal studies have focused primarily on the effects of either maternal under-nutrition (e.g. calorie or protein restriction) or over-feeding of high fat diets, little is known about the effects of macronutrient balance in modulating offspring health. Here, we investigate how maternal protein to carbohydrate (P:C) balance influences protein-specific appetite in offspring and the implications for the development of obesity. Using choice experiments, we show that offspring from dams fed high P:C diets have greater protein targets, a result consistent across sexes. We also show that greater protein targets increase food intake when placed on no-choice diets, resulting in obesity. This work could help to explain known patterns in the epidemiology of obesity and will provide fundamental new understanding of the ways in which maternal nutrition shapes offspring health.

Oral nicotinamide mononucleotide and exercise exert unique and additive effects on the gut microbiome of high-fat diet-fed mice

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Background/aims: Exercise has been widely studied for its therapeutic potential in obesity and has been shown to improve metabolic health and alter microbiome composition in both rodents and humans. Some of the benefits of exercise can be achieved through pharmacological supplementation with NAD+ precursors such as nicotinamide mononucleotide (NMN), and there is emerging evidence that these effects may be modulated by the gut microbiome which can metabolise NAD+ precursors. However, the effects of combined exercise and NMN supplementation on the faecal microbiota are unknown. Therefore, we examined the independent and combined effects of NMN and treadmill exercise in female mice with established diet-induced obesity.

Methods: Five-week old female C57BL/6J mice were exposed to control (n=16) or high-fat diet. Following 10 weeks of diet, mice were allocated to the following groups: HFD alone, oral NMN alone (400mg/kg), treadmill exercise alone (6 days/week) or exercise and NMN treatment (all n=16). Feces was collected following 8 weeks of intervention when mice were euthanized.

Results: While none of the interventions altered the high-fat diet-induced reductions in microbial species diversity, the overall microbiome composition across groups was significantly different. Overall microbiome composition was associated with fasting glucose concentration, and mitochondrial DNA copy number and Glut4 gene expression in quadriceps muscle. Predictive metagenomic analysis (PICRUSt) showed that NMN alone or NMN combined with exercise induced changes in the metabolism of some amino acids and secondary metabolites, whereas exercise alone did not exert any unique effects on predicted microbial function.

Conclusions: While exercise exerted some effects on overall microbiome composition in high-fat diet-fed mice, oral NMN and combined NMN and exercise also changed predicted microbial function. These taxonomic and inferred functional changes show associations with glucose tolerance and quadriceps gene expression, indicating a potential role for the microbiome in the observed metabolic consequences of oral NMN treatment.

Betaine supplementation augments the beneficial effects of exercise on glucose handling in a mouse model of diet-induced obesity.

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Obesity is one of the biggest health concerns of the 21st century. Previous work in obese mice showed supplementing betaine improved lipid metabolism. Interestingly, in healthy patients, betaine has been used as a form of exercise enhancement. Here we examined effects of betaine supplementation either alone or combined with treadmill exercise on the metabolic consequences of high fat diet (HFD)-induced obesity in mice.

Male C57BL/6J mice were fed control or HFD. After 15 weeks, HFD mice were split into: HFD, HFD with betaine (1.5% in drinking water), HFD with treadmill exercise, and HFD with both betaine and exercise (15 m/min for 45 min, 6 days/week; 12 mice/group) for 5 weeks, before metabolic assessments and tissue collection.

Compared to HFD, body weight and adiposity were significantly reduced (14.4% and 26% respectively) and combined exercise-betaine (14% and 31% respectively), but not betaine alone. HFD-induced glucose intolerance was slightly improved by exercise (12% decrease in ipGTT AUC vs HFD) with no effect of betaine alone. Strikingly, a significantly greater benefit was observed with combined betaine and exercise (22% reduction in ipGTT AUC vs HFD) such that glucose tolerance was similar to controls. These improvements were associated with reduced insulin levels during ipGTT suggesting enhanced insulin sensitivity, which could be mediated by upregulation of hepatic Pparg expression.
Exercise responsive hepatokinones and the modulation of glycemic control

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Introduction: Exercise training has a multitude of beneficial metabolic effects in skeletal muscle, liver and other tissues. Alterations in myokine secretion are well documented in response to exercise, however, little attention has been paid to adaptions within or secreted by the liver.

Objective: To identify hepatocyte secreted proteins from obese mice that were endurance-trained (ET) compared to sedentary and assess for the treatment of impaired glycaemic control.

Methods: Mice were fed a high-fat diet for 6 weeks, endurance-trained (ET) or remained sedentary for a further 6 weeks. Hepatocytes were isolated 3 days after their last exercise bout and cultured in EXCELL protein-free media for 24 hours. Proteomics was performed on the isolated hepatocytes and conditioned medium to assess chronic adaptions within and secreted by the hepatocytes. Insulin-stimulated glucose uptake in the soleus muscle was assessed when cultured with ET or sedentary conditioned medium. Fatty acid metabolism was assessed in 300µm precision-cut mouse liver slices cultured with U-14C-Palmitic acid in ET or sedentary conditioned media.

Results: ET mice gained significantly less weight, reflected by a reduction in total inguinal and epididymal adipose tissue mass compared to sedentary mice (p<0.05). ET mice had improved glucose tolerance (p<0.05) without changes in circulating insulin levels (P=0.2), Proteomic analysis 1590 hepatocyte-secreted proteins, of which, ET significantly altered 102 classically secreted proteins. ET hepatocyte secreted media enhanced insulin-stimulated glucose uptake in the soleus muscle ex vivo and increased fatty acid oxidation in murine liver slices. Proteomic analysis of the isolated hepatocytes detected 2657 proteins, of which, 137 proteins were significantly altered with ET. Correlation analysis demonstrates that classically secreted proteins detected in the conditioned medium are inversely correlated within the hepatocyte.

Conclusion:
Chronic adaptations in liver secreted proteins may provide an exciting novel therapeutic strategy for the treatment of obesity-related co-morbidities.

Circulating Cathepsin S improves glycemic control in mice

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Cathepsin S (CTSS) is a cysteine protease that regulates many physiological processes and is increased in obesity and type 2 diabetes. While previous studies show that deletion of CTSS improves glycemic control through suppression of hepatic glucose output, little is known about the role of circulating CTSS in regulating glucose and energy metabolism. We assessed the effects of recombinant CTSS on metabolism in cultured hepatocytes, myotubes and adipocytes, and in mice following acute CTSS administration. CTSS improved glucose tolerance in lean mice and this coincided with increased plasma insulin. CTSS reduced G6pc and Pdk1 mRNA expression and glucose output from hepatocytes but did not affect glucose metabolism in myotubes or adipocytes. CTSS did not affect insulin secretion from pancreatic b-cells, rather CTSS stimulated glucagon-like peptide (GLP)-1 secretion from intestinal mucosal tissues. CTSS retained its positive effects on glycemic control in mice injected the GLP-1 receptor antagonist Exendin (9-39) amide. The effects of CTSS on glycemic control were not retained in high-fat fed mice or db/db mice, despite the preservation of CTSS inhibitory actions on hepatic glucose output in isolated primary hepatocytes. In conclusion, we unveil a role for CTSS in the regulation of glycemic control via direct effects on hepatocytes, and that these effects on glycemic control are abrogated in insulin resistant states.

COVID-19 and Diet

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Most of the research and data on Covid-19 has focused on the severe spectrum of disease and those with major respiratory problems. In the first few months of the pandemic little attention was paid to the infected population who were not sick enough to go to hospital who made up 99 percent of cases. It turned out that Covid-19 was not just a bad flu, but in many people behaved more like an autoimmune disease affecting multiple systems in the body. My group at King’s College London and the health science company ZOE launched an app in March that captured the wider range of symptoms people were experiencing and asked them to log every day. Over 4 million people gave us data and this has provided many unique insights not available from the routine health statistics. The first after a few weeks was that loss of smell and taste was by far the single best predictor of COVID and a positive swab test. During the US and UK lockdowns, 30 percent of people gained weight, mostly in poorer areas.
We explored risk factors within the app users and found that obesity, diabetes type II, heart disease and deprivation were all major risks for both the infection and severity. They also have a common factor - poor diet. Diets lacking in fibre and made up of ultra-processed foods are bad for our gut health and reduce microbiome diversity. In turn this leads to an altered immune system that is worse at fighting infection and is associated with food allergy. Good food could be the preventive medicine we all need in fighting COVID-19.

Aligning communicable and non-communicable disease prevention: how the Covid-19 crisis in the UK might progress a healthy weight strategy

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In the 1980s Professor John Kingdon coined the phrase 'policy window' as part of a multiple streams framework when problems, policies and politics align. The Covid-19 crisis has created huge challenges for populations and governments around the world. As our understanding of the virus and the disease has developed, it has become apparent that overweight and obesity is a significant risk factor for disease severity. In the UK, the Prime Minister himself tested positive for SARS-CoV-2 and subsequently spent time in hospital with Covid-19, including requiring ventilation in intensive care. Emerging from that experience and reflecting on his own weight, he dusted down existing (and long delayed) proposals to address childhood obesity in the UK and worked with advisors to extend these proposals to adopt a more population-wide approach. The result was a national plan for England, announced in late July 27th with commitments to address unhealthy food marketing, price promotions, introduce calorie labelling and invest in weight management services and mass media campaigns. Thus Covid-19 provided a policy window to progress policies to address overweight and obesity. The national plan has some way to go before any of it is delivered. This presentation will outline what the new plan involves, the evidence underpinning it and the steps needed for implementation.

Rapid selection, characterization and clinical development of fully-human antibodies against emerging infectious diseases

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An urgent global quest for effective therapies to prevent and treat COVID-19 disease is ongoing. Neutralizing antibodies have become an important tool in treating infectious diseases. We describe parallel efforts using both humanized mice and convalescent patients to generate antibodies against the SARS-CoV-2 spike protein, yielding a large collection of fully-human antibodies that were characterized for binding, neutralization and three dimensional structure. Based on these criteria, we selected pairs of highly-potent individual antibodies that simultaneously bind the receptor-binding domain of the spike protein, providing ideal partners for a therapeutic antibody cocktail that aims to decrease the potential for virus escape mutants that might arise in response to selective pressure from a single antibody treatment. The development of resistance against these antibodies was assessed. Additionally, we evaluate the in vivo efficacy of this antibody cocktail in both rhesus macaques and golden hamsters and demonstrate that our antibodies can greatly reduce virus load in lower and upper airway and decrease virus induced pathological sequelae when administered prophylactically or therapeutically. Our results provide evidence of the therapeutic potential of this antibody cocktail.

Calories, Carbs, or Quality? What Matters Most for Body Weight

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Eating fat makes you fat. No, eating carbs makes you fat. Actually, it’s a simple equation relating calories in and calories out. Such endless debates about putative dietary culprits or cures for obesity have led to widespread public confusion and mistrust in nutrition science. But what is the truth?

In this presentation, I will discuss the physiology of body weight regulation and how we adapt to various changes in diet, including the amount of calories, carbs versus fat, as well as differences in diet quality varying in the amounts of “ultra-processed” foods.

Stealth Interventions for long-term behavior change

Tom Robinson
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Most behavioral interventions for obesity produce only modest changes and are difficult to sustain. Can the science of motivation help us design interventions to increase the magnitude and duration of behavior changes? Stealth interventions focus on process motivators, the incentive value of the intervention activities themselves -- the process of behavior change -- rather than the resulting health-related outcomes. Applying stealth intervention principles has proven successful for producing engaging and effective behavior change interventions. Social and ideological movements represent an opportunity for applying these same principles even more effectively. Because the goal behaviors of many existing social and ideological movements overlap with
Sex and age-dependent outcomes time-restricted feeding of a high-fat high-sucrose diet in rodents

Satchin (Satchidananda) Panda

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Time-restricted feeding (TRF) is a nutritional intervention wherein food intake is limited to a consistent 8-10 hours daily window without explicit changes in nutritional quantity. TRF can prevent and treat diet-induced obesity (DIO) and associated metabolic disease in young male mice fed an obesogenic diet, the gold standard preclinical model for metabolic disease research. Because age and sex are important biological variables affecting metabolic disease pathophysiology and response to therapies, we assessed their impact on TRF benefits by subjecting young or middle-aged male and female mice to ad lib or nine hours TRF of a western diet. We discovered that most of the benefits of TRF are age-dependent but are sex-dependent. The connection between adiposity and glucose intolerance was modulated by sex in the TRF cohort. Motor coordination and endurance benefits were also largely sex-dependent. However, TRF offered protection against extreme immune challenges in both sexes.
Methods
Individuals known to the obesity service were invited to participate in an online survey between March-July 2020. Behaviour around food and physical activity were measured and the Depression, Anxiety and Stress Scale-21 assessed negative emotional states.

Results
The survey was completed by 225 individuals (44.3% response rate). Respondents were mostly Caucasian (67%, n=148), and 34% (n=76) had tertiary level education. Impact on employment included working from home (24%, n=52), reduced work hours/wages (16%, n=36) and loss of employment (9%, n=6).

Exercise was performed by 64% (n=142) with 57% (n=125) reporting a decline and 18% (n=40) an increase. The most popular exercise was walking (71%, n=100), 3-4 days per week (42%, n=59), for 30-60 min (48%, n=68).

More fruit and vegetables (50%, n=109), protein (45%, n=98), dairy (43%, n=93) and snack foods (32%, n=69) were purchased "to be prepared" (51%, n=91) and "to help cope with emotions" (28%, n=50). Reasons for eating more included "To make myself feel better" (37%, n=70), boredom (31%, n=59), and "the food was there" (30%, n=57). Purchasing of takeaway foods increased in 28% (n=60) and decreased in 41% (n=89). Less of a food item was purchased "to make better choices" (34%, n=69) and "to try to reduce risk of Covid-19 exposure" (32%, n=64).

Anxiety about COVID-19 was experienced by 55% (n=120) some of the time and 21% (n=49) most of the time. Moderate to extreme anxiety or depression in the preceding 7 days was reported by 34% and 38% respectively.

Conclusion
Individuals with obesity experienced high levels of emotional turmoil during the COVID-19 pandemic. One third reported eating more food to feel better. During periods of stress and social isolation individuals with obesity may need more support, our services were curtailed.

The relationship between gender and weight loss outcomes in Australian overweight or obese adults with prediabetes: an analysis of the PREVIEW study

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Background: Obesity is a worldwide phenomenon for both genders, yet men are at higher risk of obesity-related co-morbidities due to accumulation of primarily abdominal and visceral fat. Interestingly, most individuals who participate in weight loss programs are women, and thus few trials to date have been able to recruit enough male participants to make stratification by gender viable. The PREVIEW study has shown that an 8-week low-energy diet induces different effects in men and women, presenting an opportunity to identify potential gender-specific predictors of weight loss.

Methods: Australian data was obtained for participants in the PREVIEW study. Body weight and waist circumference at baseline (CID1) were compared to measurements after 8 weeks (CID2) for each gender separately. Additional data from questionnaires (e.g. POMS, PSQI) helped assess whether differences in weight loss outcome between genders could be explained through any psycho-social variables. Missing values were calculated with multiple imputation analysis using SPSS software.

Results: On average, men lost significantly more weight (p<0.001) and waist circumference (p<0.05) than women after the 8-week weight loss period. This may be partly attributed to men having a significantly higher weight (p<0.04) and waist circumference (p<0.01) than women at baseline. Some trends identified were that women have a significantly lower baseline level of physical activity compared to men (p<0.01), yet women are significantly more likely to have higher motivation for a healthy diet compared to men (p<0.04). Men have significantly greater encouragement for changing eating habits by the family compared to women (p<0.001).

Conclusions: Gender differences identified in the PREVIEW study highlight the need for future weight loss trials to stratify weight loss results by gender. Certain characteristics may be associated with greater success for men than women on a short-term low-energy diet, however, further research is required to confirm the validity of these findings.

Improvement in quality of life, psychological distress and eating disorder risk in people with class 3 obesity in an Australian multidisciplinary weight management program

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Background
Class 3 obesity (BMI>40kg/m²) can have a substantial effect on physical and mental well-being. This study aimed to understand quality of life, psychological distress and risk of eating disorders in people with class 3 obesity, and the effect of a multidisciplinary weight management program.

Methods
This retrospective cohort study investigated all adults with class 3 obesity who enrolled in a Sydney-based multidisciplinary weight management program from March 2018-March 2019. Questionnaires were completed at baseline, 6 and 12 months to assess
quality of life (SF-36), psychological distress (Kessler Scale, K10), and risk of eating disorders (Eating Disorder Examination Questionnaire Short, EDE-QS). Physical and mental component scores (PCS and MCS) were derived from the SF-36.

Results
The 178 patients who joined the program were aged 50.8±14.10 (mean±SD) years, weighed 142.9±31.4kg, had a BMI of 51.3±9.1kg/m², and 70.8% were females. Their PCS (32.7±8.9) and MCS (34.0±7.7) were significantly lower than the Australian average, 45% were in the K10’s moderate-severe category, and 48.3% were above the EDE-QS cut-off score of 15. Baseline, 6- and 12-month questionnaire and weight data were available for 33.7% (n=60) patients, with no baseline differences between those with and without follow-up data. Compared to baseline, there was significant weight loss at 6 (132.6±25.1kg, p<0.001) and 12 months (129.9±25.6kg, p<0.001). There was no change in PCS, but there was significant improvement at 6 and 12 months in MCS (baseline:34.4±8.4; 6-month:45.8±12.8, p<0.001; 12-month:47.2±13.1, p<0.001), K10 (baseline:25.6±10.0; 6-month:20.0±9.2, p<0.001; 12-month:20.3±9.8, p<0.001) and EDE-QS scores (baseline:15.0±6.6; 6-month:13.3±5.8, p=0.02; 12-month:12.6±5.7, p<0.001). These remained significant after correcting for weight loss.

Conclusion
This study highlights the high prevalence of poor quality of life, psychological distress and eating disorder risk in people with class 3 obesity. The significant improvements in their mental health and psychological well-being, independent of weight loss, highlights the importance of multidisciplinary management in this population.

Barriers and facilitators to the implementation of lifestyle management in Polycystic Ovary Syndrome: Endocrinologists’ and Obstetricians and Gynaecologists’ perspectives

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BACKGROUND: Weight gain worsens insulin resistance and the clinical presentation and severity of PCOS. Lifestyle interventions to manage weight and reduce associated health risks are recommended as first-line treatment in polycystic ovary syndrome (PCOS) in international evidence-based guidelines. An understanding of the barriers and facilitators to implementing these guidelines amongst specialists is required to optimise care but is currently lacking.

OBJECTIVES: To describe the barriers and facilitators to the implementation of lifestyle management in PCOS from the perspectives of endocrinologists and obstetricians and gynaecologists.

METHODS: Eleven endocrinologists and ten obstetricians and gynaecologists participated in semi-structured interviews with transcripts thematically analyzed on NVIVO software.

RESULTS: At the level of the health system, both groups faced lack of access to allied health services, lack of consultation time and capacity for follow-up in specialist care as barriers and also team care or multi-disciplinary approaches to lifestyle management as enablers. At the level of medical practitioners, both groups perceived lifestyle management to be a sensitive topic to raise. Endocrinologists specifically perceived lifestyle management as relevant to their role although potentially less effective than other interventions. At the level of the patient, both groups perceived low patient motivation and adherence as a barrier. Endocrinologists cited complex obesity issues in a large proportion of patients as a barrier while obstetricians and gynaecologists perceived fertility as a motivator and facilitator in lifestyle management. Both groups reported the need for credible sources of PCOS lifestyle information and individualized lifestyle advice for patients. Endocrinologists specifically mentioned the lack of PCOS-specific lifestyle advice as a barrier.

CONCLUSIONS: Endocrinologists and obstetricians and gynaecologists experience similar systemic barriers with unique health practitioner and patient facilitators to lifestyle management. Strengthening team care approaches, providing training in initiating lifestyle discussions and dissemination of credible sources of information are needed to improve care for women with PCOS.

The efficacy of high-intensity interval training on peripheral insulin resistance, cardiometabolic risk and quality of life in non-alcoholic steatohepatitis: a pilot randomised controlled trial

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Introduction: Non-alcoholic steatohepatitis (NASH) is characterised by liver necroinflammation and profound insulin resistance and affects 37% of patients with type 2 diabetes (T2D). High-intensity exercise may be particularly beneficial for patients with NASH. We aimed to examine the efficacy of high-intensity interval training (HIIT) compared with a sham-exercise control (CON) for improving peripheral insulin resistance, cardiometabolic health and Quality of Life (QoL) in patients with biopsy-proven NASH.
Methods: Patients with NASH (57±10 years, BMI 39.2±7.0kg/m², 62% male, 69% T2D) were randomised to 12-weeks of supervised HIIT (n=7, 4x4min at 85-95% HRmax, interspersed with 3min active recovery; 3 days/week) or CON (n=6, stretching 3 days/week). Peripheral insulin resistance was assessed via gold-standard euglycaemic hyperinsulinaemic clamp. Traditional cardiometabolic risk factors, cardiopulmonary fitness (VO₂peak) and QoL (Chronic Liver Disease Questionnaire) were also assessed. Data were analysed via ANCOVA with the baseline value entered as the covariate and reported as means±SD.

Results: Adherence was 69±38% to HIIT and 82±22% to CON. Heart rate targets for HIIT were achieved in 54±30% of sessions. There was a significant between-group effect for change in insulin resistance with an improvement in maximum glucose disposal rate normalised for serum insulin (M/I) in HIIT [(0.8±0.7mg.kg⁻¹.min⁻¹/mU.L⁻¹) but not CON (1.2±1.1mg.kg⁻¹.min⁻¹/mU.L⁻¹); p=0.03]. Significant between-group differences were also observed in HIIT vs CON for change in LDL-cholesterol (0.4±0.8mmol/L vs 0.1±1.5mmol/L, respectively, p=0.01) and QoL Systemic Symptoms (0.4±0.6 vs -2.2±1.1, respectively, p=0.001). No effects were observed for change in VO₂peak or other traditional cardiometabolic risk factors.

Conclusion: High Intensity Interval Training (HIIT) is more efficacious than control for improving insulin resistance and LDL-cholesterol, and to prevent declines in QoL, in patients with NASH.

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Chicken or the egg: confidence and motivation in people with successful weight loss

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Background: Multiple issues, including genetic, physiological, psychological and environmental factors, influence the development of obesity, and make it difficult for people with obesity (PwO) to reach and/or maintain a clinically significant weight loss. To identify individual factors that may contribute to successful weight loss, we investigated the attitudes of PwO who had a successful weight loss outcome (WLO; ≥5% body weight loss maintained for ≥1 year) using data from the ACTION-IO study (NCT03584191).

Methods: An online survey was completed by adults with obesity in 11 countries. A successful WLO was defined as ≥5% body weight loss in the past 3 years that was maintained for ≥1 year.

Results: The survey was completed by 14,502 PwO. Most common weight loss methods tried were general improvements in diet (51%) and exercise (40%). A successful WLO was reported by 1,559 PwO (11%). More PwO who had a successful WLO (compared with those who had not) responded: they know how to lose weight (55% vs 44%); they know how to keep the weight off (48% vs 34%); and if they lost weight it would be easy for them to keep the weight off (31% vs 23%). In addition, more PwO who had a successful WLO stated they were motivated to lose weight than those who had not (57% vs 47%). The top weight loss goal for all PwO was to reduce the risks associated with excess weight or to prevent a health condition (48% and 46%). Fewer PwO who had a successful WLO reported worrying about the impact of their weight on their future health (46%) than PwO who had not had a successful WLO (56%).

Conclusions: A greater proportion of PwO who had a successful WLO appeared to be motivated and confident about their ability to achieve and maintain weight loss. It is unclear if their motivation and confidence is because they had lost weight or if it is the reason they lost weight. These data may suggest that increasing self-efficacy and self-concept could improve WLOs, but more research is needed.

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Health practitioners’ perspectives on telehealth for childhood obesity treatment: a focus group study

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The solution to childhood obesity lies in sustained interventions: modelling study

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Background: Childhood obesity is a significant public health concern, and much effort has been invested in interventions to reduce it. Cochrane systematic reviews have shown significant but small effects in children under 5 years (-0.26kg/m²), children aged 6-11 (-0.53kg/m²) and adolescents 12-16 years (-1.18kg/m²), but the longer term benefits of achieving these reductions are unknown.

Aim: To use the Early Prevention of Obesity in Childhood (EPOCH) model 4 to project BMI trajectories, overweight and obesity, and associated healthcare cost savings resulting from interventions in early, mid and late childhood.

Methods: The base case scenario was modelled using input data from children aged 4/5 years from the Longitudinal Study of Australian Children (LSAC). Intervention effect sizes on BMI drawn from the systematic reviews were then overlaid and then consecutively, to project expected health benefits (BMI and overweight reduction) and healthcare cost-savings accruing until late adolescence.

Results: Without intervention, the projected mean BMI in late adolescence was 24.5kg/m² and prevalence of overweight and obesity was 34%. At age 16/17 years, mean BMI resulting from the individual interventions in early, mid or late childhood were 22.8 kg/m², 22.6 kg/m², and 22.1 kg/m² and overweight and obesity was 28.1%, 27.6% and 24.2%. The model predicted savings in direct healthcare costs arising from each intervention of $92, $67 and $68 per child. However, if interventions were ongoing throughout childhood (early, mid, late), the expected outcomes in late adolescence were: mean BMI 20.9kg/m², prevalence of overweight 15.5%, and cumulative savings in healthcare costs of $187 per child.

Conclusion: Based on effect sizes from the Cochrane reviews, individual interventions are unlikely to have a major impact on adolescent overweight. However, interventions sustained throughout childhood could result in vastly improved outcomes and healthcare cost-savings by late adolescence.

2. Mead et al. Diet, physical activity, and behavioural interventions for the treatment of overweight or obese children from the age of 6 to 11 years. Cochrane Database of Systematic Reviews 2016
3. Al-Khudairy et al. Diet, physical activity, and behavioural interventions for the treatment of overweight or obese adolescents aged 12 to 17 years. Cochrane Database of Systematic Reviews 2016

Higher prevalence of autonomic neuropathy in youth with type 2 vs type 1 diabetes

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Aims
Youth with type 2 diabetes (T2D) develop complications earlier than those with type 1 diabetes (T1D), despite lower HbA1c. Cardiac autonomic neuropathy (CAN) is an independent risk factor for cardiovascular disease and may indicate subclinical complications risk in youth. However, there is a paucity of research comparing CAN between T1D vs T2D youth.
Methods
Youth aged <20 years with T1D (n=1153) and T2D (n=66) were assessed between 2009 and 2020. CAN was defined as ≥ 2 abnormal heart rate variability (HRV) measures (based on ≤5th or ≥95th percentiles for age and gender) assessed by 10-minute ECG in the following domains: Time (SD, root-mean squared and HR), Geometric (Triangular index), and Frequency (Low, High and LF:HF). Multivariable generalised estimating equations were used to examine risk factors for CAN (Diabetes type, normal/overweight vs obesity, systolic blood pressure, HbA1c, age, gender and total cholesterol).

Results
At most recent assessment, characteristics of T1D vs T2D respectively were: age (years) 16±2.2 vs 15.3±1.8, HbA1c (%) 9±1.6 vs 7.9±2.6, diabetes duration (years) 8.3±3.8 vs 2.1±1.9 and BMI 23.6±4.6 vs 32±6.3. Severe obesity (120% of 95th BMI percentile) was present in 2.3% of T1D, vs 35% in T2D (p=0.000). CAN was present in 27% of T1D vs 47% of T2D (p=0.000). CAN was present in 44% of obese T1D (p=0.000) vs 50% of obese T2D (p=0.296). In multivariable analysis, abnormal HRV across all domains (except LF:HF) was associated with having T2D, obesity, older age, higher HbA1c, systolic blood pressure and total cholesterol.

Conclusions
T2D is associated with abnormal HRV and CAN is more prevalent in T2D vs T1D youth despite shorter diabetes duration and lower HbA1c. Our findings highlight the importance of targeting modifiable risk factors (obesity and blood pressure) in youth with diabetes. Further research is needed to unravel the complex aetiology of CAN in T2D.

Increased growth trajectories of Australian infants exposed to preeclampsia

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Aims: Exposure to intrauterine preeclampsia (PE) affects the lifelong health of the child. No Australian study has investigated the impact of PE on the growth and development of infants. Therefore, the aims of this study were to: 1) compare growth outcomes at birth and 6-months and development at 6-months of infants exposed to PE or normotensive pregnancy (NP); and 2) investigate growth trajectories from birth to 6-months.

Methods: Participants were infants of women recruited to the P4 (Post-par tum, Physiology, Psychology and Paediatric follow up) Study at St George Hospital born following PE (n=74) or NP (n=293). Birth and 6-month weight and length were measured and z-scores calculated for term and preterm (<37 weeks) babies corrected for gestational age. The Ages and Stages Questionnaire assessing infant development was completed by mother/care-giver. Independent t tests assessed differences between PE and NP infants and multiple linear regression was used to develop models which best explained changes in weight and length z-score from birth to 6-months.

Results: Six-month developmental outcomes were not different between NP and PE infants. PE infants were smaller than NP infants at birth and 6-months. From birth to 6-months, PE infants had significantly greater increases in weight z-score (mean difference[SE]: 0.37[0.14], p=0.009), length (1.4[0.4]cm, p=0.001) and length z-score (0.3[0.2], p=0.039) compared with NP. Lower birth weight z-score, being first-born and lower score on the social domain explained 35% of the variation in weight z-score gain from birth to 6-months. Lower birth length z-score, increased birth weight z-score and being first-born explained 32% of the variation in length z-score gain from birth to 6-months.

Conclusions: Gains in weight and length z-score from birth to 6-months observed in the PE infants was associated with lower birth weight and length respectively. Early rapid growth associated with PE exposure may influence future cardiometabolic health.

Associations between body adiposity, aerobic and anaerobic capacity, and physical activity levels in pre-school aged children with typical and atypical neurodevelopment: results from the CATCH cohort study

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Introduction: Increased adiposity in childhood confers an increased risk of cardiovascular disease in later life. Notably, low cardiorespiratory fitness is strongly linked with poorer metabolic health in children. Children with neurodevelopmental problems are likely to be less physically fit and at higher risk of obesity. We examined associations between body adiposity, aerobic and anaerobic capacity, and device-measured physical activity in young children (aged 4-5) with both typical and atypical neurodevelopment.

Methods: Baseline data from the Coordination and Activity Tracking in CHildren (CATCH) cohort study were utilised. Assessment included: body adiposity (%) via bioelectrical impedance analysis; aerobic and anaerobic capacity via time on Bruce treadmill test and Wingate cycling test; respectively; moderate to vigorous physical activity (MVPA) via accelerometry. The Movement Assessment Battery for Children- Second Edition (MABC-2) was used to assess motor coordination and to classify children as
Cost-effectiveness of scaling up a whole of community intervention to prevent obesity in pre-schoolers nationally: the Romp & Chomp early childhood obesity prevention intervention

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Background: Romp & Chomp was a community-wide obesity prevention intervention (2004-2008) aiming to improve eating and activity environments for Geelong children aged under five (n~12,000). While the intervention was effective in reducing body mass index (BMI), it is not known whether it represents good value-for-money given scarce societal resources.

Objectives: To assess, from a government funder perspective, the cost-effectiveness of scaling up the Romp & Chomp program to a national level, measured against a no-intervention comparator.

Methods: The intervention cost (including personnel and intervention material costs) was estimated in 2018 Australian dollars based on trial records of the quasi-experimental intervention, and extrapolated to estimate the costs of delivery to all Australian children in early care and education settings. The Early Prevention of Obesity in Childhood micro-simulation model was used to estimate BMI trajectories to age 15 years based on within-trial BMI outcomes at age 3.5 years. Key outcomes were incremental cost-effectiveness ratios (ICERs; cost per BMI unit saved, cost per QALY gained across years with other cohorts at the same age. Changes in body mass index (BMI) regressed models were fitted to examine associations.

Results: Analyses included 495 participants [(5.0±0.6 years, 56% male, body adiposity 22.7±4.2%, aerobic capacity 602±99s (~50th percentile)]. Aerobic capacity (β -0.006, p<0.001), and MVPA (β -0.018, p=0.045) were negatively associated with body adiposity when adjusted for age, sex and MABC-2 score. Higher anaerobic capacity was associated with lower body adiposity, but the association did not persist when adjusted by MABC-2 score. The full model significantly predicted body adiposity (p<0.001, adjusted R²=0.52). There were no interactions by sex or MABC-2 score with any variable.

Conclusion: Lower aerobic capacity and MVPA were associated with higher body adiposity in pre-schoolers, regardless of neurodevelopment. Interventions promoting current physical activity guidelines are therefore warranted in both typically and atypically developing pre-schoolers to prevent obesity-related morbidity and mortality. Whether maintaining a high aerobic capacity in children with DCD confers protection against obesity requires longitudinal investigation.
When looking at the distribution of BMI within cohorts over time, generally an upwards shift was observed (especially for younger cohorts), and the distribution widened over time.

**Conclusions**
The increased prevalence of overweight and obesity among birth cohorts born more recently may be related to them having spent greater proportions of their lives in an obesogenic environment. The increasing prevalence of overweight and obesity with age and a tendency for BMI to increase with age highlights the importance of effective prevention strategies.

**Health system barriers to accessing care for children with weight issues**

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**Aims:** In addition to population-level prevention efforts, it is important that children and youth affected by obesity and their families have access to appropriate programmes focusing on healthy lifestyle change, and care for weight-related comorbidities. The aim of this study was to identify the barriers created and maintained by the health system that affect engagement in a family-based multidisciplinary healthy lifestyle programme for children and adolescents, and to identify those factors that also affected participant engagement in the context of the wider health system.

**Methods:** 64 semi-structured interviews with past participants of the programme (n=71) with varying levels of engagement, including those who declined contact after their referral. Half the interviews were with families with Māori (New Zealand’s Indigenous population) children, allowing for appropriate representation. Interviews were analysed using thematic analysis to identify system-level barriers.

**Results:** Five health system-level factors affecting engagement were identified: the national policy environment, lack of funding, lack of coordination between services, difficulty navigating the health system, and the cost of primary health care.

**Conclusions:** Engaging with a health system that creates and maintains substantial barriers to accessing services is difficult, affecting programme engagement even where service-level barriers have been minimised. The health system’s relative inaccessibility is an impediment to improved health outcomes for children and their families experiencing childhood obesity. Policymakers need to consider these factors when making decisions about future direction of care for childhood obesity in Australasia.

**12-month follow up of the Beat It program, an 8-week community-based group exercise and lifestyle program for people with diabetes**

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**Aims**
Regular physical activity is an integral component of effective diabetes management. This study aimed to assess 12-month physical fitness and anthropometric outcomes of the Beat It program in people with diabetes. Beat It is an 8-week community-based group exercise and lifestyle intervention offered under the National Diabetes Services Scheme (NDSS)* and delivered by Accredited Exercise Physiologists.

**Methods**
Follow up data at 12 months was collected from individuals with T2DM who had participated in the Beat It program in NSW. Anthropometric and physical fitness measures were assessed and compared with those at baseline and on immediate completion of the Beat It program at 8 weeks. The long-term effectiveness of Beat It on anthropometric and physical fitness measures over time were examined using repeat measures ANOVA, stratified by gender.

**Results**
A total of 91 participants were included in the follow up study. These individuals were aged 60 years and over. Significant improvement in waist circumference (p=0.001) in males and in body weight (p=0.03) in females was observed over time. Significant improvements in cardiorespiratory fitness (males p=0.001; females p=0.001), and upper (p<0.001 and p<0.001) and lower body strength (p=0.001 and p<0.001) over time were also observed in all. Post hoc tests found the improvements in fitness measures were significant from baseline to 8 weeks, and were maintained at 12 months. At 12 months, participants were also significantly more likely to report: improved blood glucose levels (p=0.003); greater confidence to exercise (p=0.02); and the inclusion of exercise as part of their diabetes management plan (p=0.001).

**Conclusions**
Improvements in physical fitness and some anthropometric measures following completion of the Beat It program were maintained for up to 12 months.

*The NDSS is an Australian Government initiative administered by Diabetes Australia.
Australians’ support for initiatives to protect children from digital marketing of unhealthy food and drink products

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**Background:** Reducing children’s exposure to unhealthy food and drink advertising has been identified as a key strategy to address childhood overweight and obesity. Despite a marked increase in food and drink companies using digital platforms to market their products, current industry codes on unhealthy food and drink marketing to children do not effectively protect children from digital marketing. This national survey aimed to determine public acceptability of different types of government actions to protect children from digital marketing of unhealthy food and drink.

**Methods:** The survey was delivered to 2,062 Australian adults aged 18-64 in December 2019 via two online panels: a national probability-based panel (n=1,050) and a non-probability based panel (n=1,012). The two samples were blended using calibration weighting for the final sample used for analysis.

**Results:** The majority (69%) agreed that the Government should protect children from unhealthy food and drink advertising, though there was limited consensus about up to what age children should be protected. Around two thirds (68%) each supported government action to stop unhealthy food and drink marketing on social media for users under 16 and on websites and mobile apps at times when children likely use them. Support for government action to stop a range of unhealthy food and drink marketing techniques used to target children on digital platforms was widespread (56-71%). A high proportion (81%) disagreed that companies should be able to collect children’s personal information and use it to market unhealthy food and drink products to them and most (76%) supported banning unhealthy food and drink marketing targeting children online.

**Conclusions:** Public acceptability is an important criterion for evaluating potential government interventions, with findings indicating widespread support for government action to improve regulation of food and drink marketing to children on digital platforms. Findings will inform policy development and further advocacy efforts.

Building the case for removing junk food ads from State-owned assets in Western Australia

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**Aims**

The junk food industry is the single biggest driver in the rapid rise in overweight and obesity globally. Despite the rising health care costs to Governments and disease burden associated with obesity, in many Australian jurisdictions these companies are allowed to advertise on Government owned property to drive up sales, undermining Governments’ efforts in obesity prevention. Reducing children and young people’s exposure to unhealthy food advertising is a priority for the WA State Government. The WA Health Promotion Strategic Framework 2017-2021, the WA Preventive Health Summit Summary Report; and Recommendation 2(a) in the Final Report of the WA Sustainable Health Review all recommended or called for the banning of unhealthy food and drink promotions from all State premises.

**Methods**

In August 2019, Cancer Council WA formed a partnership with the Telethon Kids Institute, to establish a Rapid Obesity Policy Translation program, enabling us to very quickly establish a program of research and advocacy efforts to build the case for obesity policy change in WA. One of these policy priorities is calling for an immediate ban on the advertising of junk food and drinks on State-owned assets, such as billboards, buses, trains and other property. Recent studies commissioned by Cancer Council WA are adding to the evidence base around the issue, with a particular focus on advertising along the trip to school Cancer Council WA is also leveraging the LiveLighter® advertising campaign to highlight the need to remove this form of advertising.

**Results**

Using case studies and examples from recent WA research projects, this presentation will highlight the extent of exposure of junk food advertising around metropolitan schools, and critique similar polices implemented overseas and in Australia, and describe industry arguments against this policy.

An experimental comparison of walking time & Health Star Rating labels on product perceptions and preferences

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**Aims:** To examine the effect of Walking Time (WT) and Health Star Rating (HSR) labels on product preferences and perceptions and motivations.

**Methods:** An online, between-subjects experiment tested responses to three labelling conditions: (i) no label (control); (ii) HSR; (iii) WT. Participants (N=1,268 adults, aged 18-59) viewed sweet snacks, savoury snacks and drinks of varying healthiness and energy content in each condition. Participants rated the energy content and healthiness of each item, completed a product preference task, rated the labels on cognitive, emotional and motivational measures, and then reported their dietary and physical activity intentions.

**Results:** WT labels were more effective in promoting preference for healthy savoury snacks and drinks and discouraging preference for less healthy savoury snacks and drinks, but did not affect sweet snack preferences. As hypothesised, WT labels yielded significantly lower mean energy ratings for healthy sweet and savoury snacks and drinks; and a significantly higher mean energy rating for the less healthy savoury snacks compared to other conditions. WT participants also rated the less healthy and healthy savoury snacks lower on healthiness. Participants showed more positive cognitive responses to the WT labels compared to the HSR labels, yet more negative emotional responses. There was no effect of labelling condition on intentions. Participants shown WT labels were more motivated to reduce their daily energy intake and do more exercise in response to the labels compared to participants in the HSR label condition.

**Conclusions:** WT labels were more effective in promoting healthier product preferences and motivating reduced energy intake and increased physical activity. Supporting previous experimental findings reported by Abraham and Sheeran, these data suggest that WT labels offer a promising tool for helping consumers to eat less and exercise more.

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**Protein kinase C epsilon affects glucose homeostasis in fat-fed mice through actions in multiple tissues**

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Lipid-activated protein kinase C epsilon (PKCe) is believed to impair insulin action in the liver upon fatty acid oversupply. We have previously shown that global PKCe deletion protects mice against the glucose intolerance caused by a high fat diet and also improves insulin-mediated suppression of hepatic glucose production (HGP). Surprisingly, liver-specific deletion of the kinase had no effect, while deletion in adipose tissue resulted in a partial protection of glucose tolerance.

To further clarify the role of the kinase, we have examined PKCe deletion in other insulin target tissues. Specific neurons of the hypothalamus have been implicated in the indirect suppression of HGP by insulin. We now show that deletion of PKCe in AgRP neurons partially protects against glucose intolerance observed in fat-fed mice. However, euglycaemic-hyperinsulinaemic clamp studies indicate this does not involve insulin-mediated suppression of HGP. An alternative mechanism concerns altered glucose-sensing in the hypothalamus, which is dependent on AMPK. In vitro treatment of GT1-7 hypothalamic neurones with the fatty acid linoleate, which activates PKCe, modulates AMPK phosphorylation, consistent with a role for the kinase in regulating this pathway.

We have also examined deletion of PKCe in skeletal muscle, which again partially improves glucose tolerance in fat-fed mice. Although a related PKCe isoform, PKC6, has been linked to inhibition of proximal insulin signaling in this tissue, we did not observe changes in insulin receptor, IRS-1 or Akt phosphorylation in muscle upon insulin stimulation of muscle-specific PKCe KO mice in vivo. However, voluntary exercise and muscle function were increased upon PKCe deletion, again consistent with a role for the kinase downstream or even independent of insulin signal transduction.

Taken together, these findings indicate the diverse roles of PKCe in glucose homeostasis, and also further underscore the utility of targeting the kinase to treat glucose intolerance.

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**The effect of GIP receptor knockout on lipid- and whole-body metabolism in HFD-fed mice.**

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Glucose-dependent insulinotropic polypeptide (GIP) has long been linked to regulation of adiposity, and studies with GIP receptor knockout mice have shown that these mice are resistant to diet-induced obesity. There is, however, controversy on the mechanism behind this resistance. With this study, we aimed to gain more in-depth knowledge on how knockout of the GIP receptor affects lipid- and whole-body metabolism in mice fed a HFD for 9 weeks, to ultimately understand how alterations in lipid metabolism contribute to the adiposity phenotype.

Similar to previous findings, GIPr KO mice showed reduced body weight gain and fat mass compared to WT littermates. Furthermore, GIPr KO mice showed higher energy expenditure, while food intake and the respiratory exchange ratio was similar between groups, suggesting that GIP knockout does not affect systemic fat oxidation. Interestingly, upon an oral lipid challenge, lipid uptake into liver was decreased while uptake into inguinal adipose tissue (and muscle, n.s.), but not epididymal or brown adipose tissue, was significantly increased. These results suggest that knockout of the GIP receptor potentially affects liver-centric redistribution of VLDL-derived triglycerides to adipose tissue and muscle. However, this was not related to differential
expression of lipoprotein lipase. In addition to increased adipose capacity for triglyceride uptake, GIPr KO mice showed increased capacity for fatty acid uptake into adipose tissue. The mismatch between increased lipid uptake into adipose tissue but reduced adipose mass could be related to increased rates of adipose lipolysis in GIPr KO mice, particularly following beta-adrenergic stimulation.

Taken together, these results suggest that the observed reduction in body weight and fat mass in GIPr KO mice is potentially due to an increase in energy expenditure and lipolysis, while we further uncovered a novel role for the GIP receptor in mediating liver-adipose tissue crosstalk.

Effect of chemogenetic neuropeptide Y neuron activation in the central amygdala on the modulation of energy homeostasis and macronutrient preference

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Aim: Neuropeptide Y (NPY) is an orexigenic neurotransmitter that is expressed throughout the central nervous system, including the central amygdala (CeA). It has previously been observed that NPY neurons in the CeA regulate energy homeostasis in animals subjected to chronic stress paradigm and access to a high-fat diet. However, the role of NPY neurons in the CeA on feeding behaviours in standard conditions remains unclear. This study aimed to investigate the effect of activation of NPY neurons in the CeA on food intake and macronutrient preference under a free feeding paradigm.

Methods: The transgenic NPY-Cre+/C57BL/6 mice were used to examine the effects of NPY neuronal activation in the CeA on feeding behaviours. The chemogenetic Designer Receptors Exclusively Activated by Designer Drug (DREADD) technique was employed to stimulate the activity of the CeA NPY neurons. Mice received either the excitatory DREADD virus or a control virus bilaterally infused into the CeA. After viral expression, mice received clozapine-N-oxide (CNO) or saline peripherally prior to intake experiments in a within subjects crossover design. The food consumption and macronutrient preference (fat - 10% intralipid solution vs carbohydrate - 5% sucrose solution) tests were performed in a BioDAQ system for automated recording of feeding behaviours.

Results: Following administration of CNO, NPY-Cre+ mice demonstrated greater food intake compared with the control group; this effect was the result of an increase in the number of bouts, with no differences in meal duration. There was no difference observed in fat vs carbohydrate preference; however, predictably, total consumption of these palatable diets was increased in CNO-treated animals compared with control animals.

Conclusion: These results demonstrate the important role of neuropeptide Y neurons in the CeA for regulating energy homeostasis both during access to standard and palatable diets, however these data suggest this pathway does not alter macronutrient preference.

Parental diet effects and lifespan in Drosophila

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Recent studies have reported that changes in the macronutrient content of diets that individuals consume can have effects that span generations, affecting expression of offspring phenotypes. Most previous studies reporting such effects have focused on maternal effects associated with dietary modification; none have explored the capacity for interactions between the diets of both parents to shape phenotypic expression of offspring. Here, we manipulated sucrose levels of adult female and male fruit flies (Drosophila melanogaster) prior to mating, and then in the diets of their offspring, and then measured lifespan and triglyceride levels in the manipulated flies. Our design was factorial; flies were provided with diets that were either higher or lower in sucrose, such that parental combinations and parent-offspring combinations were either matched or mismatched in dietary sucrose. When dietary sucrose was matched between parents, they lived longer than but produced shorter-lived offspring, than flies with mismatched diets. Furthermore, the effects of dietary manipulation on lifespan were matched with underlying changes to triglyceride levels in both parents and offspring, indicating the intergenerational effects are at least in part mediated by direct regulation of cellular fat levels. Our results reveal a signal of parent-offspring conflict over optimal concentrations of dietary sucrose.

Cutaneous microvascular dysfunction is associated with obesity severity and adiposity in adults with type 2 diabetes

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**Aims:** Obesity and diabetes independently contribute to cutaneous microvascular dysfunction via pathological processes that are not yet comprehensively understood. We sought to determine if obesity severity is associated with cutaneous microvascular dysfunction and measures of peripheral arterial disease in adults with type 2 diabetes via cross-sectional observational study design.

**Materials and methods:** Primary outcomes were post-occlusive reactive hyperaemia (PORH) as determined by laser-Doppler fluxmetry (peak flux post-occlusion, time to peak flux post-occlusion, peak as a percentage of baseline flux, and the area under the curve [AuC] index post-occlusion to pre-occlusion). Secondary outcomes were ankle- and toe-brachial indices (ABI and TBI) and systolic toe pressure.

**Results:** Thirty-six participants (20 men, 16 women) with mean age 55±8 years, BMI of 36±5 kg/m² and duration of diabetes 8±6 years underwent measurements. Moderate, significant correlations were identified between total percentage body fat and: (i) AuC index (r: -0.42, p=0.02); (ii) peak as a percentage of baseline flux (r: -0.4, p=0.02), and (iii) TBI (r: 0.39, p=0.03), respectively. Moderate, significant correlations were identified between BMI and both AuC index (r: -0.37, p=0.03) and peak as a percentage of baseline flux (r: -0.38, p=0.03) as well between body weight (r: -0.36, p=0.03) and visceral adipose tissue (r: -0.38, p=0.03) with time to peak.

**Conclusion:** These findings demonstrate an impairment in cutaneous microvascular function related to adiposity and obesity severity in adults with type 2 diabetes and suggest that obesity may have a pathological effect on cutaneous microvascular function in the absence of overt macrovascular disease, which warrants further investigation.

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**Harnessing ultraviolet light to reduce metabolic dysfunction**

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Sunlight, and ultraviolet radiation (UV), are essential for life and have shaped how lifeforms acquire energy. Human life has evolved under the influence of sunlight; however, our lifestyles are changing, with more sedentary time spent indoors. We have observed that regular exposure to low (non-burning) doses of UV reduced weight gain and metabolic dysfunction in mice fed a high fat diet. Effects of UV were independent of circulating 25-hydroxyvitamin-D and not mimicked by vitamin D supplementation. Instead, UV-induced nitric oxide bioactivity in irradiated skin was identified as a beneficial pathway, even in mice with established glucose intolerance. Dietary nitrate did not mimic the effects of UV. A significant increase in uncoupling protein-1 (UCP-1) – an essential marker of thermogenesis (heat production) – was observed in interscapular brown adipose tissue (iBAT) located beneath the irradiated skin site, 24 h after a single low dose of UV. However, through detailed circadian analyses, no substantial shifts in UCP-1 were observed when mice were exposed to low dose UV and fed a high fat diet. Instead, interscapular skin temperatures, liver steatosis, and the "whitening" (white adipose phenotype) of iBAT were reduced by UV via pathways involving nitric oxide. UV also regulated mRNAs in iBAT linked with fatty acid transport, lipolysis, lipogenesis and inflammation, independent of nitric oxide. In other studies, low dose UV and physical activity combined with synergy to promote thermogenesis in iBAT. UV also had systemic anti-inflammatory effects and modulated the phenotypes of macrophages and conventional dendritic cells in iBAT. Combined with observations of metabolic benefits in human studies, controlled exposure to sunshine or low dose UV has potential to curb the development of type-2 diabetes and obesity. Further research is needed to determine whether our pre-clinical observations can be reproduced in people.

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**The effect of low-dose hydralazine on obesity-related chronic kidney disease**

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**Aim:** To determine whether hydralazine prevents obesity-related chronic kidney disease (CKD) using a mouse model.

**Background:** Obesity significantly predisposes individuals to the development and progression of CKD. Hydralazine has previously been shown to reduce renal fibrosis in mouse models of unilateral ureteral obstruction and folic acid nephropathy, via DNA demethylation. This suggests a role of epigenetics in the development of CKD, and that DNA demethylation may prevent CKD progression.

**Methods:** Male C57BL/6 mice received high fat diet (HFD) or chow with either low-dose hydralazine (25 mg/L) in drinking water, or normal drinking water for 24 weeks. Biometric and metabolic parameters, renal functional and structural changes, renal global DNA methylation, and markers of renal fibrosis, inflammation and oxidative stress were assessed. Genomic DNA from kidney tissue underwent Reduced Representation Bisulfite Sequencing to assess differential methylation due to obesity and hydralazine treatment.
Results: HFD-fed mice developed obesity, glucose intolerance, hyperinsulinaemia and dyslipidaemia. Obesity increased albuminuria and glomerulosclerosis, which were significantly ameliorated by low-dose hydralazine without lowering the blood pressure. Obesity increased renal global DNA methylation, and this was attenuated by low-dose hydralazine. Several genes were hypermethylated due to obesity, and this effect was attenuated by hydralazine. Increased kidney fibrosis, inflammation and oxidative stress were observed in obese mice, however these were not significantly improved by hydralazine.

Conclusion: Low-dose hydralazine ameliorated HFD-induced albuminuria and glomerulosclerosis, independent of alterations in biometric and metabolic parameters, blood pressure, renal fibrosis, inflammation or oxidative stress. The observation that hydralazine attenuated obesity-induced hypermethylation of several genes suggests an epigenetic mechanism of renoprotection. These data support repurposing hydralazine as a novel therapy to prevent CKD progression in obese patients.

Exercise and High-Fat Diet in Obesity: Functional Genomics Perspectives of Two Energy Homeostasis Pillars
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Publish consent withheld

Secreted Protein Acidic and Rich in Cysteine: Metabolic and Homeostatic Properties beyond the Extracellular Matrix Structure
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Broken Energy Homeostasis and Obesity Pathogenesis: The Surrounding Concepts
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Obesity represents an abnormal fat accumulation resulting from energy imbalances. It represents a disease with heavy consequences on population health and society economy due to its related morbidities and epidemic proportion. Defining and classifying obesity and its related parameters of evaluation is the first challenge toward understanding this multifactorial health problem. Therefore, within this review we report selected illustrative examples of the underlying mechanisms beyond the obesity pathogenesis which is systemic rather than limited to fat accumulation. We also discuss the gut-brain axis and hormones as the controllers of energy homeostasis and report selected impacts of obesity on the key metabolic tissues. The concepts of “broken energy balance” is detailed as the obesity starting key step. Sleep shortage and psychological factors are also reported with influences on obesity development. Importantly, describing such mechanistic pathways would allow clinicians, biologists and researchers to develop and optimize approaches and methods in terms of diagnosis, classification, clinical evaluation, treatment and prognosis of obesity.

Metabolic and behavioural effects in offspring exposed to maternal sucrose consumption: A systematic review and meta-analysis of data from rodent models
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There is growing recognition the origins of obesity begin in-utero; extensive research has consistently shown an increased risk of childhood obesity when the mother is obese or consumes a high-fat high-sugar diet. What remains unclear is the potential influence sugar alone may have on the developing foetus. Epidemiological studies have found an association between the
consumption of sugar–sweetened beverages (SSBs) during pregnancy and childhood adiposity. Because they can eliminate confounds, animal models have advanced our understanding of the mechanisms involved in maternal over-nutrition. Given SSB intake is a prime target for the prevention of excessive weight gain during pregnancy, it is important to validate the epidemiological findings in animal studies.

We conducted a systematic review and meta-analysis to identify potential relationships between maternal sucrose consumption and metabolic outcomes in offspring of rodent models. We analysed studies that provided dams with sucrose solutions (8–20%/w/v) prior to conception, during pregnancy and/or lactation and reported offspring outcomes of body weight (BW), body composition and glycaemic control. Following an extensive database search (PubMed, EMBASE, Web of Science and Scopus), we included 15 studies for review and quantitatively synthesised data from 184 dams and 323 offspring. Meta-analyses were performed on maternal and offspring BW and fasting glucose levels (FGLs), with subgroup analyses of strain, concentration, exposure period and offspring sex.

Maternal sucrose exposure was associated with a significant increase in adult offspring BW (SMD=0.47; 95% CI=0.13, 0.81; I²=36%), specific to Sprague Dawley rats. Poor glucose disposal was observed in adult offspring; although no change was evident in FGLs (SMD=0.32; 95% CI=−0.18, 0.82; I²=55%). We also revealed study design and reporting weaknesses, predisposing many of the papers to bias.

Current recommendations to reduce SSB consumption during pregnancy and lactation remain valid, not only for the metabolic health of mothers, but also for future generations.

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**Energy metabolism in trefoil factor family member 2 (Tff2) KO mice beyond the protection from high-fat diet-induced obesity**

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Publish consent withheld

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**The effect of preconception vs intrapartum weight modulation strategies on maternal metabolic outcomes and metabolic inflammation in late gestation mice**

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Background/aims:

Maternal obesity, affecting 20% of pregnant women, negatively impacts metabolic health in mothers. Maternal complications include gestational diabetes, fatty liver disease and cardiovascular disease. Intrapartum diet modification is advocated, but has limited efficacy. To date, no studies have addressed whether preconception maternal weight loss improves outcomes, or alters metabolic inflammation in the liver. We aimed to determine if weight loss prior to pregnancy, with diet modification treatment, improves maternal weight and metabolic outcomes compared to intrapartum diet modification.

Methods:

Maternal obesity was modelled in C57BL/6 mice; with dams fed a high fat diet (HFD) versus chow diet for 8 weeks and compared to lean chow-fed controls. In obese dams, diet modification (switch to chow) was utilised to induce pre-conception weight loss, or following confirmation of pregnancy. Pregnancy rates were observed after mating. Maternal anthropometry, glucose tolerance and metabolic markers were measured before and after intervention, and at late gestation. Pregnant dams were sacrificed at gestational Day 18.20 and maternal blood and liver were collected. Immunohistochemistry, western blotting and real-time PCR were used to determine tissue-specific metabolic profiles in liver.

Results:

HFD-fed dams had reduced glucose tolerance compared to chow-fed dams (p<0.0001), and upregulated expression of metabolic and inflammatory markers in late gestation (eg FAS, TGFβ <0.05). Following intervention with pre conception diet modification, insulin resistance and body weight were reduced (p<0.001), with improved fecundity. In late gestation, glucose tolerance was best optimised in those with preconception diet change, compared to those with intrapartum diet change (Area under the curve 81.97 vs 100.1mmol/L/min, p=0.003). Liver metabolic and inflammatory markers (CD68, FAS) were improved in diet-switch groups compared to those from HFD-fed mothers.

Conclusions:
Preconception weight modulation strategies are effective in altering maternal weight prior to pregnancy, with ensuing alterations in pregnancy outcomes. It further improves maternal metabolic profiles.

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### BSA as a potential therapeutic for obesity

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**Background:** Non-alcoholic fatty liver disease (NAFLD) is a broad term that encompasses several disease states associated with fat accumulation in the liver. Non-alcoholic fatty liver (NAFL) is the most benign disease characterised by excessive fat accumulation in the liver that cannot be attributed to alcohol usage, and is generally viewed as the hepatic component of the metabolic syndrome (MetS) (1). Low serum albumin is a clinical diagnostic indicator of NAFLD in patients (2).

**Aim:** To determine the effect of albumin treatment on the pathogenesis of NAFLD.

**Methods:** NAFLD disease was induced in male C57BL/6 mice by feeding a high fat diet enriched with fructose, palmitate and cholesterol for 10 weeks. Mice were treated with BSA dissolved in saline, via intraperitoneal injection, every other day for 6 weeks. Mice were weighed weekly, and glucose tolerance tests were performed before and after treatment. At the experimental endpoint, tissues and plasma were collected for subsequent RT-qPCR and histological analyses, and assays for the determination of markers of disease. Results were assessed using a one-way ANOVA.

**Results:** BSA treatment prevented diet-induced weight gain in both chow fed and NAFLD-diet fed mice (P=0.0004 chow vs. Chow-BSA and P=0.0004 NAFLD vs NAFLD-BSA), reduced hepatic fat accumulation (P=0.0060 chow vs. Chow-BSA and P<0.0001 NAFLD vs NAFLD-BSA), and reduced circulating NEFA (P=0.0016 NAFLD vs. NAFLD-BSA). This is possibly due to reduced hepatic inflammation (P=0.0135 NAFLD vs. NAFLD-BSA).

**Conclusion:** BSA could potentially be used to improve liver health in obesity and NAFLD.


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### Male rats consume commercial beverages sweetened with non-nutritive sweeteners. An ecological study in rodent models.

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Recent concern over non-nutritive sweetener (NNS) consumption on weight gain and metabolic dysfunction has seen a surge in the number of related animal studies. Yet commonly, models do not mimic human consumption for dosage, sweetener combinations or feeding patterns, limiting translational relevance. The primary goal for this preclinical work was to translate findings of NNS research to humans; as such, we attempted to find an ecologically valid model of NNS consumption. The aims were to investigate if i) rats consume commercially available beverages sweetened with NNS (CAB-NNS), ii) prior sucrose exposure alters palatability and iii) metabolic recovery is possible following chronic sucrose exposure. Forty male naïve Sprague Dawley rats (n=8/group) were randomly assigned to five groups: Diet Coke, Sprite, Cordial No Sugar, Kombucha and Control. Preference and Acceptance testing was conducted prior to and following a four-week period of 10% w/v sucrose feeding. Animals were then given four-weeks of ad libitum access to assigned CAB-NNS, with controls provided access to water only. Consumption intakes, bodyweight and FBGL tests collected throughout the experiment (full methods available at [https://www.preclinicaltrials.eu/](https://www.preclinicaltrials.eu/)) and retroperitoneal fat pads measured at cull. No group differences in bodyweight observed at any point (p>0.05). Rats consumed these NNS beverages during 4-h acceptance testing, with no significant reduction in acceptance following chronic sucrose exposure. Following the switch from sucrose to NNS, no group difference was observed in FBGL or retroperitoneal fat mass (p>0.05). These results demonstrate rats will drink commercially available beverages sweetened with a variety of NNS with or without energy content. Importantly, when switched from sucrose to NNS drinks, no difference in metabolic outcomes was evident between water and NNS groups, thus it is possible recovery following chronic sucrose exposure may be retarded in male rats.

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### Outcomes and predictors of success for very low energy diet from Canberra obesity management service

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**Background:**
Very low energy diets (VLED), when conducted under appropriate medical supervision, can contribute to sustained weight loss, reduced lipids and improved glycaemic control. The Canberra Obesity Management Service (COMS) uses a multidisciplinary group-based mode I of care to conduct VLED using 12 weeks of optifast based caloric restriction under medical and dietitian supervision.

Methods:
We undertook a retrospective clinical audit of data from patients completing VLED during 2018, 2019 and the first half of 2020. Descriptive analyses summarized baseline demographics, anthropometric data, COMS engagement and weight-related medical comorbidities and medications. T-test analyses evaluated changes in weight, BMI, glycemic control, blood pressure and cholesterol following 6 and 12 weeks of VLED. Multivariate analysis explored baseline variables which predicted clinically significant weight loss and failure to complete VLED.

Results:
For the 66 patients who completed VLED, we found statistically significant weight loss following 6 and 12 weeks of VLED and statistically significant improvements in glycaemic control, blood pressure, and cholesterol and reductions in medications required to manage these comorbidities. Prior engagement with an exercise physiologist at COMS was the only baseline variable which statistically significantly predicted clinically significant weight loss following 12 weeks of VLED. Number of mental health comorbidities and weight gain producing medications at commencement with COMS predicted failure to complete VLED.

Conclusions:
VLED are an effective method to reduce weight and improve weight related comorbidities. Prior engagement with an exercise physiologist may contribute to greater success with VLED.

Classifying obesity as a disease requires its redefinition
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Blood Glucose Monitoring Practices of People with Diabetes
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Monitoring glucose levels is a recognised tool used to support daily decision making in diabetes management. It also contributes to the delay or prevention of diabetes-related complications of both type 1 diabetes and type 2 diabetes. Blood glucose monitors have an extended lifespan, however, may not be reliable, with outdated technology. People may be using unreliable equipment or struggling to use it as recommended. From July 2019 to February 2020, 829 people with type 1 (11%) and type 2 diabetes (89%) had their monitor checked accuracy, including if they used the monitor and lancing device as recommended. Results indicated 78% (632) people had never had their monitor checked, with 52% of monitors 4 years or older.

- Correct time/date - 58% needed the time/date adjusted
- Battery replaced - 16% needed a new battery
- Accurate control solution - 95% monitors had accurate control solution checks
- Test Strips - 16% were using out-of-date test strips by 1 - 6 years
- Monitor replaced - 13% of monitors were replaced on the day

The main requests for additional education were set-up and use of monitor (26%), when to check glucose level (21%) and how to obtain a blood sample (22.5%). Other issues were how to use their lancing device (11%) and safe disposal of used lancets (10%). People indicated having their meter checked increased confidence in the accuracy of results and use of equipment (95%). Outcomes: Checking monitoring equipment increased people’s confidence in the functionality and accuracy, providing an opportunity to resolved any issues. It also encouraged re-engagement with their diabetes team for further review and education. A regular check of monitoring equipment should be part of ongoing diabetes review, to ensure people are able to use their equipment as recommended. This service could be provided by a pharmacist, diabetes educator or practice nurse.
Intermittent fasting increases growth differentiation factor 15 in comparison to energy-matched daily calorie restriction in females with overweight or obesity

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Background & Objective: Growth differentiation factor 15 (GDF15) activates GRFAL receptor in the hindbrain, suppressing food intake in non-human primates. Metformin, 8-weeks of severe caloric restriction, and 24-48 hours of fasting increased circulating GDF15 in humans. This study aimed to compare the effects of 8-week intermittent fasting versus energy-matched moderate daily calorie restriction (CR) on GDF15.

Study type: Open-label, parallel-group, randomised-controlled trial (NCT01769976)

Methods: Eighty-eight females (50±1 years, BMI 32.4±0.5kg/m²) were randomised in a ratio of 2:2:2:1 into one of four diets at 70% (IF70 and CR70) or 100% (IF100 and control) of calculated energy requirements. Food was provided, and intake recorded using daily checklists. Individuals in the IF groups fasted for 24h on three non-consecutive days every week, whereas CR participants received food at 70% energy requirement daily. Anthropometric data and fasting blood samples were collected after a 12h fast in week 0 and 8, and again after a 24h fast for IF groups during week 8. This analysis only included samples from completers in CR70 (n=23), IF70 (n=22), and IF100 (n=22).

Results: IF70 resulted in greater weight and fat loss than CR70, mediated by a greater reduction in energy intake than was provided in this group. When measured after a 12h fast, IF70 induced a greater change in GDF15 than CR70 after 8 weeks (+7.9±3.9 pg/ml versus -4.1±4.6 pg/ml respectively, p=0.016). There was no difference between IF70 or CR70 compared with the IF100 group (+1.1±2.9 pg/ml, p=0.086 and 0.501 respectively).

Conclusion: Prescription of an energy-matched diet with an intermittent fasting approach led to greater weight loss and increase in GDF15 as compared to daily CR. We speculate the increase in GDF15 could have contributed to the spontaneous reduction in energy intake in IF70.

Funding agencies: The research was funded by NHMRC Project Grant APP1023401.

Use of partial meal replacement in class 3 obesity in an Australian public weight management program

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Background
Partial meal replacement (PMR) (one or two per day) is an effective tool for short-term weight loss. Evidence and acceptability for longer term use in people with class 3 obesity (BMI>40kg/m²) are lacking. This study aimed to find the proportion of people using PMR in a multidisciplinary weight management program, and compare their weight loss with those not using PMR.

Methods
A retrospective cohort study of all adult patients enrolled into a multidisciplinary weight management program in Sydney between March 2018-March 2019. PMR use and duration was extracted from patient records along with demographic data and weight.

Results
Of 178 participants enrolled, 143 (80.3%) completed at least 6 months in the program. Of those, 66 (46.2%) had used PMR at any point during the program while 77 (53.8%) had not. There were no baseline differences in the PMR vs non-PMR groups in age (Mean±SD: 52.8±13.2 vs 52.6±13.9 years, p=0.93), gender (female% 66.7% vs 74%, p=0.34), weight (143.6±30.0 vs 140.3±33.0kg, p=0.53) or BMI (50.8±8.6 vs 51.0±9.2kg/m², p=0.87), or presence of co-morbidities including diabetes and hypertension. Both groups had significant weight loss at 12 months, with no difference between groups (PMR:9.4±7.6kg vs non-PMR:8.6±9.3kg, p=0.62). Although there was no major difference between groups in weight loss in the first 6 months (PMR:5.7±4.4kg vs non-PMR:7.3±5.6kg, p=0.18), there was significantly greater weight loss between 6 and 12 months in the PMR group compared to the non-PMR group (PMR:3.7±4.7kg vs non-PMR:1.3±6.8kg, p=0.03). In the PMR group, there were no differences in baseline or weight loss in those that had used PMR for >3 months compared to <3 months.

Conclusion
In a multidisciplinary weight management program, PMR is a well-accepted tool for weight loss in people with class 3 obesity, and those on PMR seem more likely to continue losing weight after the initial 6 months.

Obstructive sleep apnoea does not affect weight loss at 12 months in patients with class 3 obesity - a retrospective study from an Australian publicly funded weight management program

A retrospective study from an Australian publicly funded weight management program.
Impact of COVID-19 restrictions on self-managed weight-loss journeys

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Aims: We examined weight-loss, food consumption, and physical activity changes over COVID-19 lockdown period in a sample of adults actively attempting weight-loss, and compared differences between those who self-reported their diet (DI) or exercise (EI) was impacted against those who indicated diet (D0) or exercise (E0) was not impacted.

Methods: Between mid-January and mid-March 2020, Australian adults attempting weight-loss were recruited to a 12-week online follow-up survey study. As this occurred across the period of COVID-19 restrictions, we additionally surveyed its effects on participants’ weight-loss journeys.

Results: Of 229 participants who had completed the initial survey, 58 responded to the additional questions. Only 2 respondents reported positive impact and were excluded. The remaining 56 participants had a good age distribution but skewed towards higher education, English-speaking, women.

A majority (70%) were affected, with (60%) reporting diet-impacts such as stress eating, and 52% reporting exercise-impacts such as closures of gyms, and loss of social exercising.

Nearly a third lost weight (i.e.≥3% of body weight) with a greater proportion of unaffected participants (33%), losing weight, compared with 28% in the affected groups. There were no differences in the dietary change between the DI and D0 groups as indicated by median food-consumption-scores. The median walking time increased by 10 minutes overall (-14, 76) and improvement occurred in both EI and E0 groups, but a decline of 7 minutes (-82, 0) in vigorous activity was seen in the EI group possibly associated with gym closures. None of the results were statistically significant.

Conclusions Participants described a range of issues that disrupted their diet and activity patterns during social isolation. Those reporting impact were less successful at weight-loss. No differences in reported dietary behaviours could be detected but vigorous physical activity may have been reduced in those who reported impacts to their exercise routines.
Data linking body mass index (BMI) and dental utilisation with oral and general health variables including dental anxiety, oral health related quality of life (OHRQoL), wellbeing and mental health are lacking. This study aimed to explore the relationship between BMI and these parameters in individuals attending a hospital-based obesity service.

Methods
Adult patients of the Nepean Family Metabolic Health Service (NFMHS), were invited to participate. Data on oral and general health were obtained through surveys and the participants’ medical records.

Results
Of the 82 individuals who consented to participate, 81 (98.8%) completed the study questionnaire and 74 (91.3%) answered additional screening questions relating to their general wellbeing and mental health. The median BMI of the cohort was 49.1 kg/m² (IQR 43.2-57.3 kg/m²) and median age 51 (IQR 39-63) years. Of participants, 50 (61.7%) reported that their last dental visit was more than one year ago and 24 (29.6%) of participants reported high levels of dental anxiety. Across the cohort, there were no significant differences between groups in terms of BMI, age, and dental anxiety. OHRQoL was not significantly correlated with any of the variables of dental utilisation, dental anxiety, OHRQoL, wellbeing or mental health (p>0.05).

Conclusions
Patients with clinically severe obesity reported poor dental utilisation and high levels of dental anxiety, which had no significant association with BMI. Medical complications, lack of wellbeing and poor mental health may complicate dental management. These factors, and the limitations of conventional dental chairs, for a majority of these patients, support an increased number and promotion of bariatric dental facilities, including Special Needs Dental Units, in addition to education of dental practitioners in obesity management.

Effect of caloric restriction and intermittent fasting on the anti-inflammatory and cholesterol efflux properties of HDL-c in a randomised controlled trial

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Background: The anti-inflammatory and cholesterol efflux capacity of high-density lipoprotein cholesterol (HDL-c) underlie its cardio-protective effect [1]. Increasingly these functions of HDL-c are found to correlate with clinical outcomes [2]. This study compared the effects of energy-restricted diets delivered as 70% daily caloric restriction (CR) or intermittent fasting (IF) on HDL-c functionality.

Methods: Women (N=88; 50±1y, BMI 32.3±0.5 kg/m²) were randomised to one of four groups (IF70, CR70 (provided 70% of calculated baseline energy requirements)) or 1F100 and control (provided 100% of baseline energy requirements) for 8-weeks. This secondary analysis includes participants from a subset of CR70 (N=10) and IF70 (N=10), who had lost >5% of body weight and were not taking lipid-lowering medications. Cholesterol efflux of HDL-c was assessed from 3H-cholesterol-loaded macrophages and the anti-inflammatory properties of serum and HDL-c were assessed by exposure to endothelial cells (ECs). mRNA levels of inflammatory genes vascular adhesion molecule-1 (VCAM-1), intracellular adhesion molecule-1 (ICAM-1) were assessed by qPCR. Analysis of mRNA data was performed by t-tests with and without removal of an extreme outlier in each group.

Results: The IF70 group displayed greater weight loss and reductions in total cholesterol versus CR70, but the change in HDL-c was not different between groups. There was an increase in cholesterol efflux by HDL-c from baseline in IF70 only (P<0.01). There were no between or within group effects detected in the anti-inflammatory actions of HDL-c. However, after removal of the outliers, ECs VCAM-1 and ICAM-1 mRNA levels were reduced following treatment with IF70 serum (P=0.039 and P=0.002). ICAM-1 mRNA levels were reduced in ECs treated with HDL-c from CR70 (P=0.001) and IF70 compared to baseline (P=0.009).

Conclusion: Both dietary interventions improved anti-inflammatory effects, whilst only IF70 increased cholesterol efflux. These findings have implications for the role of HDL functionality in IF-induced weight loss.

The nexus between nature and nurture to address picky eating in Australian children.
Picky eating in children is a familiar complaint amongst caregivers however it can contribute to poor dietary intake and overall nutritional status. The nexus between a nurtured lower preference and intake of bitter tasting vegetables and a natural endophenotype sensitivity to bitter taste may underly these picky eating behaviours. Whilst picky eating is commonly measured as parental reported behavioural or appetite trait, a validated tool investigating caregiver perceptions of children’s pickiness for all food groups is understudied. An age-appropriate questionnaire allowing children to self-report their own food preferences is also un charterred. This three-stage cross-sectional study targeting primary caregiver and children (7-12 years) across Australia aims firstly, to examine children’s food preferences via the development and validation of the Picky Eating Questionnaire (PEQ) and Child-reported Food Preference Questionnaire (C-FPQ). Secondly, to investigate bitter taste phenotype of participants by 6-n-propylthiouracil (PROP) taste sensitivity test. Phase 1 (developing and piloting the PEQ and C-FPQ) will invite participants (15-20 caregivers children pairs) for a semi-structured interview after completing the questionnaires. Phase 2 will validate the PEQ and C-FPQ on 369 pairs. Participants in phase 2 will be invited to phase 3 for PROP testing and to record anthropometric measurements for BMI z-score and waist-to-height ratio (WHtR) calculation. This study investigates the less explored relationship between picky eating, taste sensitivity and childhood obesity simultaneously, and challenges the notion of simply labelling the child as ‘picky’ by examining the nexus between nature and nurture thereby informing interventions addressing picky eating.

Adolescents, Instagram and #weightloss: what makes a popular post?

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Aims: Adolescents with obesity report attempting weight loss, yet engagement with health services is poor. Social media may be a source of weight-related information given its frequent use. This study aimed to describe weight loss content visible on an adolescent social media account.

Methods: The top 600 images were captured from #weightloss using an adolescent Instagram profile. Images were categorised and coded based on a pre-determined ontology as food (core or discretionary), people (group, individual, before/after), or type of information. Individual and before/after photos were coded for sex (male, female, unclear) and ethnicity (white, non-white, unclear) and individual images coded for body shape (adiposity and muscularity) and pose.

Results: At the time of data collection, there were 67.8m posts to #weightloss on Instagram. Of 600 images, 208 (34.7%) were of individuals, predominantly females (n=172) and of white (n=76), non-white (n=47) or unclear (n=85) ethnicity. Body types were thin (n=65), average (n=90) or higher weight (n=12) with little to none (n=51), visible (n=54) or high level (n=14) muscularity. Close to half of images of individuals were focused on accentuating body features with either a fitness/muscle accentuating (n=44) or sexualised (n=43) pose or both (n=6). From 165 (27.5%) food images, 117 were core and 48 were discretionary foods. Of 107 (17.8%) before/after images, 96 depicted weight loss and 4 muscle building in females (n=91). Most information-based images (n=93, 15.5%) were related to weight loss programs or products (n=43) and few provided nutrition (n=12) or exercise (n=2) information. The remaining 27 (4.5%) images did not fit within these categories.

Conclusions: Weight loss related posts visible to adolescents on Instagram are primarily of females posing in a body-focused way or using before/after weight loss images. Few provide useful nutrition and exercise related information to assist with healthy weight loss.

The associations between sitting, standing, stepping time, and breaks from sitting and cardiometabolic health markers among children.

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Background
Since there is limited evidence, we aim at determining the association between device-measured sitting time, light intensity activities and cardiometabolic health markers among children using data from a cross-sectional study.

Methods
Sitting, standing, stepping time and the number of breaks from sitting were assessed using ActiPAlS whereas ActiGraph-GT3X accelerometers were used to assess moderate to vigorous physical activity (MVPA) in a group of 114 children (8.2±0.5 years) from Melbourne, Australia. Health measures were also obtained, which included: adiposity (i.e. z-score waist circumference [zWC], body mass index [zBMI], blood pressure [i.e. systolic, SBP and diastolic, DBP], high-density lipoprotein (HDL), low-density lipoprotein (LDL), cholesterol, triglycerides, glucose, insulin, and vitamin D. Associations between time spent sitting, standing, stepping time and breaks from sitting were examined using linear regression models adjusted for age, and time spent in MVPA.

Results

Conclusions
Excessive time spent sitting might be associated to negative health effects (higher blood glucose), however, light intensity activities (i.e. standing, stepping, and break from sitting) could be associated to healthier parameters (lower SBP, DBP and zBMI and higher vitamin D values). Experimental designs may be necessary to determine the impact of interrupting and/or replacing sitting time with light intensity activities on cardiometabolic health markers among children.

Longitudinal associations between changes of sleep duration and body mass index in early childhood

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Background/aims: Sleep duration has been linked with childhood obesity. Yet longitudinal association between sleep duration and body mass index (BMI) z-scores in early childhood remains to be explored. This study examined the interrelationship between developmental trajectories of sleep duration and BMI z-scores in early childhood.

Methods: Data were from the Melbourne INFANT program, a prospective cohort with 4-month-old infants being followed-up until age 60 months (n=528). Sleep duration (total, daytime, nighttime) and BMI z-score were measured at ages 4, 9, 18, 43 and 60 months. Group-based trajectory modelling was used to describe trajectories of sleep duration and BMI z-score from ages 4 to 60 months. Multivariable logistic regression was conducted to assess the association between sleep duration and BMI z-score trajectories.

Results/findings: Three nighttime sleep duration trajectory groups were identified: “Long stable” (10.5 to 11.0 hours, 61%), “Catchup long” (8.0 to 11.5 hours, 23%), and “Short stable” (8.7 to 9.8 hours, 16%) nighttime sleepers. Four BMI z-score trajectory groups were emerged: “Low-BMiz” (-1.5 to -0.5 unit, 21%), “Mid-BMiz” (-0.5 to 0.5 unit, 58%), “High-BMiz” (0.8 to 1.4 unit, 21%), and “Catchup long” (0.8 to 1.4 unit, 21%). Both “Catchup long” and “Long stable” nighttime sleepers were more likely to be members of the “Mid-BMiz” group. Similarly, children from “Low-BMiz” and “Mid-BMiz” groups were more likely to be “Long stable” nighttime sleepers. With adjustment for child and maternal covariates, both “Catchup long” (OR 3.69 95%CI 1.74, 7.92) and “Long stable” nighttime sleepers (OR 4.27 95%CI 2.21, 8.25) revealed higher odds of being in the “Mid-BMiz” group. By contrast, daytime or total sleep duration trajectories were not associated with BMI z-score trajectories.

Conclusion
Long nighttime, but not total or daytime, sleep duration was associated with lower BMI z-score trajectories in early childhood. Our findings underpin the importance of adequate nighttime sleep for body weight development in early childhood.

Combined Influence of Waist and Hip Circumference on Risk of Death in a Large Cohort of European and Australian Adults

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BACKGROUND: Waist circumference and hip circumference are both strongly associated with risk of death; however, their joint association has rarely been investigated.

METHODS AND RESULTS: The MONICA Risk, Genetics, Archiving, and Monograph (MORGAM) Project was conducted in 30 cohorts from 11 countries; 90 487 men and women, aged 30 to 74 years, predominantly white, with no history of cardiovascular disease, were recruited in 1986 to 2010 and followed up for up to 24 years. Hazard ratios were estimated using sex-specific Cox models, stratified by cohort, with age as the time scale. Models included baseline categorical obesity measures, age, total and high-density lipoprotein cholesterol, systolic blood pressure, antihypertensive drugs, smoking, and diabetes mellitus. A total of 9105 all-cause deaths were recorded during a median follow-up of 10 years. Hazard ratios for all-cause death presented J-or U-shaped associations with most obesity measures. With waist and hip circumference included in the same model, for all hip sizes, having a smaller waist was strongly associated with lower risk of death, except for men with the smallest hips. In addition, among those with smaller waists, hip size was strongly negatively associated with risk of death, with ~20% more people identified as being at increased risk compared with waist circumference alone.

CONCLUSIONS: A more complex relationship between hip circumference, waist circumference, and risk of death is revealed when both measures are considered simultaneously. This is particularly true for individuals with smaller waists, where having larger hips was protective. Considering both waist and hip circumference in the clinical setting could help to best identify those at increased risk of death.
Preventing childhood obesity by focusing on a life course approach. The Health in Preconception and Pregnancy (HiPP) Centre of Research Excellence

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As is the case in other countries, two-thirds of Australian adults are overweight or obese with reproductive aged women leading this trend, gaining more weight yearly than older women and progressing more rapidly to obesity than men. Over half of Australian women enter pregnancy overweight or obese. Excessive gestational weight gain (GWG) above US Institute of Medicine (IOM) recommendations occurs in over 40% of pregnancies in Australia and in developed countries internationally and increases the risk of subsequent childhood and maternal obesity. Approximately, 57% of Aboriginal and Torres Strait Islander women are overweight or obese at conception and culturally and linguistically diverse (CALD) women also experience high rates of excessive GWG.

Despite years of research, millions of dollars invested in preconception programs and in randomised controlled trials in pregnancy, implementation and translation of evidence is lacking. Crucial knowledge gaps now rest in implementation research, translation, workforce development and collaboration. In 2019 a Centre of Research Excellence (CRE) was awarded by the Australian National Health and Medical Research Council to support a multidisciplinary international team of researchers to generate the new knowledge needed to improve lifestyle preconception and in pregnancy, and reduce maternal obesity and related health outcomes. Our Health in Preconception and Pregnancy (HiPP) initiative is also global, having formed the first Global Alliance for HiPP in September 2018 with representatives from all continents, including consumers. This presentation will outlines >10 years of research from our research centre and investigators (including our most recently funded MRFF research) and covers the areas of focus of the CRE, including: (1) lifestyle health and weight management prior to conception and during pregnancy; (2) workforce capacity building in relation to lifestyle health behaviour change during the perinatal period; and (3) the development of a CRE HiPP Consumer and Community Involvement framework.

The barriers and enablers affecting the healthy lifestyle behaviours, weight maintenance, and wellbeing of working women during preconception and pregnancy: a qualitative study using the COM-B model

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Aims: The purpose of this qualitative study was to describe the barriers and enablers to healthy lifestyle behaviours, weight management, and wellbeing experienced by working women during the preconception and pregnancy periods using the COM-B (capability, opportunity, motivation, behaviour) model.

Methods: Five semi-structured focus groups were conducted with 25 women working in an Australian university setting. The women were asked about the specific health and wellbeing needs of working women during the preconception and pregnancy periods. Data analysis was informed by theory-driven codes, derived from the COM-B model, and data-driven codes using open, selective, and thematic coding. Focus groups lasted approximately 90 minutes and were audio-recorded, transcribed verbatim, and coded using NVivo 12 and Mural.

Results: Barriers and enablers were organised in relation to the COM-B domains across four overarching themes: (1) hierarchy of needs and values; (2) social interactions; (3) a support scaffold; and (4) control. Physical opportunity (including equitable access to resources and work role attributes) was the most highly represented COM-B subcomponent and these barriers and enablers were categorised across three of the four overarching themes. Social opportunity (including work relationships and cultural norms) and reflective motivation (including self-efficacy and expectations) were also identified as key COM-B subcomponents and these barriers and enablers were found to be associated with two of the four themes. The COM-B subcomponents of automatic motivation (e.g., habit formation), physical capability (e.g., pregnancy status), and psychological capability (e.g., knowledge building) were each present in one of the four themes.

Conclusion: This research suggests that a holistic and contextualised approach to support healthy lifestyle behaviours, weight management and wellbeing of women of reproductive age is necessary. Use of tools such as COM-B can enable workplaces to target specific areas of concern in order to optimise their employee wellbeing and assist intervention implementation.

Enhancing self-efficacy to improve physical activity behaviours in adults with diabetes: evaluation of the Ready Set Go, Let’s Move! Program

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Aims: With only 34.1% of Australians meeting the physical activity and sedentary behaviour guidelines, effective, scalable solutions are critical. The primary aim of this evaluation project was to assess if a one-off person-centred behaviour change workshop could improve self-efficacy and physical activity behaviours in adults with diabetes.

Methods: Participants in NSW and the ACT were invited to attend a Ready Set Go - Let’s Move! Workshop via the NDSS® database. Evaluations were collected at baseline and post workshop for six months with a three month follow up sent to June 2019 attendees
(n=275). Information regarding diabetes self-efficacy (DES-SF), knowledge, confidence and behaviour change were collected. Data was analysed using descriptive statistics and paired t-tests with p<0.01 considered significant.

Results:
934 participants had matched pre-post evaluations with 106/275 also completing a three-month follow-up. Significant improvements in diabetes related self-efficacy (DES-SF), knowledge and confidence were seen post workshop (P<0.01). At three months: 87% reported doing more physical activity; 81% more incidental activity; 76% reported to reduce their sitting time; 61% reported other lifestyle changes; and 59% added a new type of exercise to their regime. In addition, the increased diabetes self-efficacy levels were maintained at three month follow-up (P<0.01). Higher DES-SF scores indicate participants are more likely to achieve self-management goals in the long term.

Conclusion:
Our findings indicate the Ready Set Go - Let’s Move! Program successfully empowers participants to self-manage their condition, improves their confidence and promotes increased physical activity levels in adults living with diabetes: offering a suitable adjunct to existing efforts to improve physical activity participation in a high-risk population.

"The NDSS is an Australian Government initiative administered by Diabetes Australia.

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Is food marketing on social media associated with dietary intake in Australian adolescents?
Findings from a national cross-sectional survey
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Background/Aims: Unhealthy food marketing is prominent on social media and the use of such platforms is widespread among adolescents. Such persistent and ubiquitous promotion of energy-dense, nutrient-poor (unhealthy) foods may provide a barrier to consuming nutritious, high-quality food essential for development and disease prevention. This study aims to examine the association between exposure to and engagement with food or drink advertisements on social media and unhealthy food and drink intake in Australian adolescents.

Methods: A representative sample of secondary school students aged 12-17 years (N=8,708) self-reported their frequency of exposure to food and drink advertisements on social media, ‘liking’ or ‘sharing’ of food or drink posts, and consumption of a variety of unhealthy food and drinks. Multi-level logistic regression assessed the association between exposure to and engagement with food advertising on social media and high intake of unhealthy food and drinks.

Results: Fifty-five percent of students reported seeing a food or drink advertisement on social media at least weekly, while engagement with such advertising was less frequent. High intake of unhealthy foods and drinks was reported by 45% and 10% of students, respectively. Exposure to a food or drink advertisement on social media at least once in the last month was associated with a high intake of unhealthy food, while liking or sharing a food or drink post at least once in the last month was associated with a high intake of unhealthy food and unhealthy drinks (all p<0.001). As students’ level of engagement with this type of marketing increased, so too did their likelihood of having a high intake of unhealthy food and drinks.

Conclusions: Holding manufacturers to higher standards in their digital marketing of unhealthy food and drink products through improved policy design and enforcement capability is important in enabling young individuals to maintain a healthy diet.

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Utility decrements associated with adult overweight and obesity in Australia: a systematic review and meta-analysis
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Purpose: To conduct a systematic review and meta-analysis of health state utility decrements associated with overweight and obesity in adults 18 years and over, for use in cost-effectiveness modelling and economic evaluation in Australia.

Methods: A systematic review was conducted in nine databases to identify studies that reported health state utility values by weight status. Random-effects meta-analysis was used to synthesise average utility decrements (from healthy weight) associated with overweight, all obesity and obesity classes 1, 2 and 3. Heterogeneity surrounding utility decrements was assessed via subgroup analysis, random-effects meta-regression and sensitivity analyses.

Results: 12 studies were found for which data was used to synthesise utility decrements, estimated as: overweight 0.020 (95% CI: 0.010, 0.030), all obesity 0.055 (0.034, 0.076) and obesity class 1 0.047 (0.017, 0.077), class 2 0.072 (0.028, 0.116) and class 3 0.084 (0.039, 0.130). There was considerable heterogeneity in our results, which could be accounted for by different age distributions and utility instruments used in contributing studies.

Conclusions: Our results demonstrate that increasing weight status is associated with small but statistically significant reductions in utility compared with healthy weight, which will result in reduced quality-adjusted life years when extrapolated across time and used in economic evaluations.

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Impact of COVID-19 on adults’ eating habits and physical activity to inform healthy lifestyle campaign messaging

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Aims: COVID-19 has led to restrictions that have impacted the daily lives of Australian adults and families. This includes the way that we shop, the type and amount of foods we consume, and physical activity undertaken. The survey aimed to assess the quality and quantity of changes in adult’s eating habits and physical activity as a result of COVID-19 restrictions to inform future campaign messaging about attaining and maintaining a healthy lifestyle.

Methods: Shape of Australia is a cross-sectional survey of 2,000 adults aged 18 to 65 from all Australian states and territories, with the sample recruited in July 2020 from a nonprobability online panel. Respondents self-reported changes in household structure and income, snacking behaviour, fruit, vegetable, fast food, sugary drink and alcohol consumption, household grocery expenditure, use of online delivery services, meal preparation, physical activity and screen time that have occurred during COVID-19 restrictions and whether it is anticipated these changes will be maintained in the future.

Results: Results will be available prior to the conference and will describe self-reported changes in behaviour, as well as the differing impacts of COVID-19 restrictions on demographic subgroups including parents and residents of low socio-economic areas.

Conclusions: These results will inform the nature and content of campaign messaging aimed at encouraging the adoption and maintenance of healthy eating and physical activity behaviours. This messaging will be primarily delivered via the mass media but will also seek to engage the community through social media, online resources and advocacy. Campaign messaging aimed at promoting a healthy lifestyle will need to be responsive to the significant changes to everyday life that have occurred as a result of COVID-19 restrictions.

Will an obesity pandemic replace the coronavirus disease-2019 (COVID-19) pandemic?

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see the attachment


A new Socio-Ecological Framework for Maternal Obesity Prevention

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Obesity in the reproductive life phase is one of the most significant periods for the prevention of obesity for women and the next generation. The existing Ecological Systems Theory (EST) model for maternal obesity prevention1 highlights how a woman and her behaviour interact with surrounding influences, including inter-personal relationships and environmental and policy contexts. Women are at the centre of the model, therefore, they are seen as “responsible” for lifestyle change, which is associated with significant blame and weight stigma. Furthermore, understanding of the interactions between EST layers is lacking, despite bottom-up strategies for policy mobilisation and stakeholder partnerships being touted as important approaches for obesity prevention. Consequently, appropriate application of the EST model as a theory-driven approach for the prevention of maternal obesity is rudimentary. To address these issues, a new Socio-Ecological Framework for Maternal Obesity Prevention is presented. This framework moves the woman from the central focus, removing the burden of individual responsibility, blame, and weight stigma and uses visual cues to reinforce that all layers are inextricably linked. In applying this framework, researchers should: (1) use the framework as a theoretical guide for their research; (2) generate knowledge for each of the socio-ecological layers, especially on the interactions between the layers; (3) use bottom-up and stakeholder inclusive research processes with stakeholders from all socio-ecological layers represented; and (4) use the evidence generated to form a new conceptual basis upon which to progress research. The new Socio-Ecological Framework for Maternal Obesity Prevention will expand our thinking and reduce the burden and implicit blame on women of reproductive age. It can guide future research to inform the design, implementation, and translation of appropriate interventions, practice guidelines, and policies that go beyond the prevailing focus on individual lifestyle change and address broader socio-ecological issues that hinder effective maternal obesity prevention.


Dietary patterns associated with obesity outcomes in adults: an umbrella review

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Objective: The aim of this umbrella review was to summarize the evidence from existing systematic reviews on the association between different dietary patterns and overweight/obesity outcomes in adults.

Design: We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, and searched the MEDLINE, EMBASE, CINAHL, Cochrane, Scopus, and Web of Science for systematic reviews reporting on diet patterns and weight gain or overweight/obesity outcomes.

Result: We identified 16 systematic reviews with 143 unique studies published between 2001 and 2019. Overall quality scores ranged from four to 10. Six reviews in 2/11 cohort and 6/19 cross-sectional studies reported (statistically significant) decreased odds ratios (ORs) for obesity (range: 0.53 to 0.73 and 0.35 to 0.88, respectively) associated with the Mediterranean diet. Three reviews in 5/15 cohort and 10/45 cross-sectional studies reported an inverse association between diet quality and weight gain or body mass index (BMI) range: -1.3 to -0.09. Two reviews in 1/3 cohort and 1/2 cross-sectional studies reported a decreased risk of obesity (OR=0.76) and weight gain (OR=0.26), respectively, with fruit and vegetable intake. Four reviews of mixed diet patterns in 3/46 cross-sectional studies reported an increased prevalence of obesity (OR=1.19) or abdominal obesity (OR range: 1.07 to 1.27) with the Korean diet pattern.

Conclusions: Our umbrella review confirms the hypothesis that Mediterranean-type dietary patterns reduce the risk of obesity in adults. Potential stakeholders may consider the role of Mediterranean-type dietary patterns in obesity prevention interventions, with caution.

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Understanding the barriers to treating childhood obesity in Australian General Practitioners

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Childhood obesity (COb) is a growing global pandemic with the number of obese children worldwide set to increase by 50% by 2025. Among Australian children (5-17 years), prevalence of overweight and obesity has risen from 21% to 27% (1995-2015), with those living in Regional/Remote areas 1.5 times more likely to be above a healthy weight than those in major cities. Those within the lower socio-economic groups, and Australian Indigenous people are more likely to be overweight or obese. Despite General Practitioners (GPs) considering COB an important healthcare priority, their provision of treatment does not match guideline recommendations. This research aims to evaluate GPs' management of COB and investigate differences between metro and regional/rural doctors.

This mixed methods, cross-sectional survey study incorporated qualitative and quantitative questions in an online questionnaire distributed among Australian GPs (n=239), which assessed knowledge, confidence, and attitudes towards COB management in clinical practice.

GPs demonstrated varied knowledge; just 20% accurately defined COB and overall knowledge of guideline recommendations was moderate to high. Confidence in clinical scenarios relating to COB was high, however, GPs lacked confidence in community support options available for COB management. Rural GPs (n=127) were significantly more likely (p<0.032) to cite time and potential for negative parental or child reactions as strong barriers to COB management.

This study offers new insights into Australian GPs’ knowledge of COB, explicitly assessing respondents’ knowledge of the guidelines, demonstrating that GPs should collectively improve COB-related knowledge. Support for GP registrars and rural GPs must be improved, which is particularly important given high rates of overweight and obesity in regional and rural Australia. GPs require and want support in the form of multidisciplinary community management options and these findings must be presented to governing bodies to drive change on an organisational level, as progression in this area is underdeveloped.

Increasing confidence to treat childhood obesity: an interventional study of undergraduate medical students

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Childhood obesity (COB) strongly predicts adult overweight and obesity and is an increasing global health concern. Evidence suggests that general practitioners lack confidence to initiate discussions around COB with patients and consistently do not raise the issue. This lack of confidence may begin during medical studies due to a lack of content in the medicine curriculum. We aimed to assess the confidence of medical students in leading conversations related to COB and healthy lifestyle with the families of obese children, before and after an intervention designed to improve student knowledge of COB.

An interventional, pre-post study was conducted whereby medical students were surveyed before (n=92) and after (n=53) attending a series of eight educational seminars. In seven likert-scale questions, students were asked to state how confident they would be to address COB in a clinical setting. Knowledge of COB was assessed in sixteen multiple-choice knowledge-based survey questions; data was analysed using Chi-square test. An additional open-ended question assessing the usefulness of the lecture series was included in the post-survey and was analysed using thematic analysis.

Following the intervention, a statistically significant effect (p<0.01) was observed in just one knowledge question, suggesting there was little overall improvement in students' knowledge. However, students reported being more confident to discuss with a child’s family member a healthy diet, health impacts of obesity, benefits of, barriers, and readiness to make lifestyle changes...
The Health in Preconception, Pregnancy and Postpartum Early- and Mid-Career Researcher Collective: Achieving collective action for the prevention of maternal obesity

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Aim: Cross-sector and interdisciplinary collaboration are required to achieve collective action for maternal obesity prevention. Therefore, building early- and mid-career researchers’ (EMCR) capacity to achieve collective action into the future is essential. The aim of this abstract was to describe our national Health in Preconception, Pregnancy, and Postpartum (HiPPP) EMCR Collective and the activities undertaken to develop our purpose and goals.

Methods: The Collective’s inaugural meeting (Sydney, October 2019) was attended by 12 EMCRs and 5 mentors with expertise across: preconception, pregnancy, postpartum, and early childhood health; obesity; dietetics; exercise science; psychology; preventive health; medicine; discovery research; epidemiology; co-design; consumer and community involvement (including Aboriginal and culturally and linguistically diverse involvement); policy, health economics; implementation; and translation. Guided by the ‘Simplified Framework for Understanding Collective Action’ we participated in a group discussion to identify our purpose and undertook a priority setting exercise using the Nominal Group Technique and Modified Delphi approach to identify our key goals.

Results: Our purpose is to create opportunities for EMCRs to build capacity, form collaborations, transcend discipline and sector-based silos, and generate impact across research, policy, and practice pertaining to maternal obesity and related outcomes. We identified two prioritised goals: (1) build relationships, partnerships, and collaborations with stakeholders, including people with lived experience, policy makers, healthcare professionals, and government and non-government organisations; and (2) generate impact via implementation research and knowledge mobilisation. To achieve these goals, we are developing our collaborative capabilities both within and external to the HiPPP EMCR Collective. EMCR capacity building is embedded within our activities.

Conclusion: The HiPPP EMCR Collective, as the future generation of researchers, are working to strategically develop appropriate and effective capacity, infrastructure, and support systems to ensure we can deliver collective action towards optimising maternal obesity outcomes for mothers and their children, now and in the future.

Customer and staff opinions and attitudes towards a healthy beverage intervention in sport and recreation facilities in Victoria, Australia

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Aim: To evaluate customer and staff attitudes before and after a healthy beverage retail intervention in sports and recreation facilities in Victoria, Australia.

Methods: Eight Victorian local governments implemented an intervention in council-owned sporting facilities to either limit the availability of sugary drinks to <20% of total display or remove them from display (March 2018–March 2020). Customers and staff were invited to complete cross-sectional surveys at baseline (June–September 2018) and follow-up (June–September 2019). Tailored surveys investigated opinions on the need for healthy beverage options, and staff opinions on organisational intent related to healthy offerings. Responses at baseline and follow-up were compared using logistic regression or an ordered logistic regression.

Results: Surveys were completed by 1,079 customers and 162 staff at baseline, and 1,188 customers and 183 staff at follow-up. The majority responders believed that sporting facilities should promote healthy eating (baseline: customers 79%; staff 76%; follow-
up: customers 75%; staff: 73%) with fewer believing that removing sugary drinks from sporting facilities will help reduce consumption (baseline: customer 55%; staff 46%; follow-up: customers 51%; staff: 48%), or that promoting healthy eating was a high priority in their facility (baseline: staff 40%; follow-up: 50%). The only statistically significant difference between baseline and follow-up was the observation that more staff believed at follow-up that their facility had made healthy changes in the past six months that were still in place (baseline: 19%; follow-up: 42%, p<0.001).

Conclusion:
Our study suggests that both before and after an intervention, most customers and staff believe sporting facilities should promote healthy eating, even though they have doubts about whether removing sugary drinks will result in behaviour change. More work is needed to align the healthy lifestyle message at these facilities with beverage availability and further increase the confidence of customers and staff in healthy retail interventions.

Health communication in a pandemic: achievements and learnings
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Introduction
Formerly known as The Parents’ Jury, Parents’ Voice was formed in 2004 by 12 parents and has since grown into a movement of over 10,000 Australian parents combining their voices to campaign for change to our obesogenic environments.

Context and aim
Co-morbidities such as obesity bring increased risk of severe coronavirus (Obesity Evidence Hub, 2020). Continuing good health behaviours is therefore important but made more difficult due to ‘lock-down’ restrictions. Parents, in particular, are having to juggle increased responsibilities and new barriers.

The ‘Tips from Teddy’ campaign was created to encourage and support parents and children to eat, sleep and move well.

Methods and analysis
The ‘Tips from Teddy’ campaign was launched on Instagram and ran for 21 days straight offering parents healthy tips related to three core topics: healthy eating, physical activity and wellbeing.

The campaign had two primary objectives: 1. To inform parents in a fun and engaging way (using a teddy), and 2. Get parents to participate in the activities, encouraged via a social media competition.

Translational outcomes
Participation in the competition was low, parents reported that being asked to participate via posting their own photos on social media photos placed unnecessary burden on them.

This lack of participation mirrors difficulties in engaging low socio-economic communities in obesity prevention campaigning. As people with uncertain housing, food access and security have an understandably higher barrier for participation.

The participants’ feedback and Instagram metrics also revealed that during a crisis parents preferred to receive peer-led, supportive health information even if they were unable to act immediately.

Future actions
Communicating in a crisis needs to focus on providing information, reassurance and support via tailored approaches that avoid unnecessary calls-to-action.

Further work will apply these learnings to intersectional campaigning with communities that experience participation barriers and health inequities.

Longitudinal analysis of overweight and obesity in children and adolescents
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Aims
This presentation summarises an analysis of Longitudinal Study of Australian Children (LSAC) data, describing patterns of overweight and obesity prevalence and persistence over time for children and adolescents in two cohorts.

Methods
Up to 7 waves of data for the ‘B’ and ‘K’ LSAC birth cohorts were analysed, spanning from when the B cohort was aged 2–3 to 12–13 and the K cohort was aged 4–5 to 16–17. The prevalence of overweight and obesity in each wave was analysed by sex and socioeconomic position. The proportion of children and adolescents who changed weight categories over time was also analysed.

Results
The proportion of overweight or obese children generally increased with age, with a larger increase observed in the older K cohort. There were few differences between boys and girls, but more disadvantaged children were more likely to be overweight or obese. A large proportion (44% and 47%) were overweight or obese in at least one wave, while 5.4% and 7.0% were overweight or obese in all waves.

Children aged 6–7 and under more commonly changed weight categories, and there was generally a similar or higher proportion moving from overweight/obese to normal/underweight compared with the opposite direction. Across both cohorts, from age 8–9
onwards, there was generally a higher proportion moving to overweight/obese (5.5–8.5%) than there was moving to normal/underweight (3.1–5.5%).

Conclusions
Overweight and obesity in children tends to increase with age and is more common in more disadvantaged children. From age 8–9 onwards, overweight and obesity is more likely to develop than to resolve. Interventions targeting children at age 8–9 and older may help reduce the prevalence of overweight and obesity in the longer term.

Addressing childhood obesity in regional Western Australia – An innovative approach.

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Background:
Obesity is a significant public health issue within Western Australia (WA), with 24.9% of 5 to 17-year-olds classified as overweight or obese. The online version of the Better Health Program (TEAM Kids) is a ten-week healthy lifestyle program for 7-13-year-old children classified as overweight or obese. Participants complete weekly online learning sessions, supported by weekly 30-minute phone-based consultations.

Aims: To determine whether a combination of online modules and phone call coaching is a viable option when delivering health interventions in regional Western Australia.

Methods:
Analysis was conducted on program data, focusing on the impact of the program on participants’ dietary and physical activity behaviours, self-esteem and their anthropometric measures.

From January to July 2019, 86 children aged 7-13 years from regional Western Australia were recruited for TEAM Kids with 69.8% completing four or more coaching calls and four or more online learning sessions. All places on the program were funded by the WA Country Health Service.

Results:
Significant changes were observed post-program for BMI (-0.70, n=61), physical activity hours per week (+7.1hrs, n=59), self-esteem (+3.7, n=53) and total nutrition score (+4.9, n =60) (p<0.001). In addition, increased consumption of water (Z= -4.68, n=60), wholegrain bread (Z= -4.92, n=60) and improved overall food variety (Z= -5.51, n=59) was observed and found to be statistically significant (p<0.001); Consumption of discretionary foods were also reduced (n=60, p<0.001).

Conclusions:
These findings demonstrate that a combination of online and phone-based program delivery can be used to provide effective lifestyle interventions in regional areas.

Challenges of making healthy lifestyle changes for families in Aotearoa New Zealand: why prevention and intervention must work together

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5. Department of Paediatrics, Taranaki District Health Board, New Plymouth, New Zealand

Aims: While multidisciplinary interventions can provide support for children with obesity and their families, there are potentially enduring influences on nutrition and physical activity outside of the family control. It is important that families are able to sustain healthy lifestyle changes in order to achieve reduction in weight status over time and address weight-related co-morbidities. The objective of this study was to identify challenges of making and sustaining healthy lifestyle changes for families involved in a multidisciplinary intervention in Aotearoa New Zealand.

Methods: A secondary analysis of semi-structured interviews was undertaken, focusing on participants who had previously self-identified challenges of making healthy lifestyle changes. Participants were parents/caregivers (n=42) of children/adolescents referred to a family-focused multidisciplinary assessment and intervention programme for childhood obesity, with varying levels of engagement, including those who declined contact after their referral (non-service users).

Results: Participant-identified challenges included financial cost, impact of the food environment, time pressures, stress, maintaining consistency across households, independence in adolescence, concern for mental health and frustration when not seeing changes in weight status.

Conclusions: A range of factors contributed towards participants’ ability to make and sustain change, including factors at the wider socio-environmental level beyond their immediate control. Even with the support of a multidisciplinary healthy lifestyle programme, participants found it difficult to make sustained changes within an obesogenic environment. Healthy lifestyle intervention programmes and families’ abilities to make and sustain changes requires alignment of prevention efforts, focusing on policy changes to improve the food environment and eliminate structural inequities.
**Adapting the LiveLighter message to support people at home during COVID-19**

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1. Cancer Council WA, Subiaco, WA, Australia

**Background**
LiveLighter® is a healthy lifestyle campaign funded by the WA Department of Health and implemented by Cancer Council WA, which aims to reduce the rates of overweight and obesity amongst Western Australian adults. A major component of the campaign is its TV-led mass media advertising activity which is normally delivered over three waves each year. In March 2020 Cancer Council WA suspended LiveLighter® TV advertising given the disruption to life caused by the COVID-19 pandemic. Instead, Cancer Council WA developed two new non-TV LiveLighter® campaigns which would seek to support and motivate people to lead a healthy lifestyle while adhering to restrictions.

**Methods**
Two distinct and positively framed LiveLighter campaigns: ‘Move More April’ and ‘Healthy At Home’ were run between April and July 2020.

Move More April was an unpaid campaign that ran across LiveLighter®’s social media channels throughout April. It used organic posts to promote physical exercises which could be performed without equipment, thereby offering solutions to being active at home. Healthy At Home was broadcast over 10 weeks between May – July across radio, out-of-home and digital channels. Advertisements drove people to a new ‘healthy at home hub’ on the LiveLighter® website, which encouraged people to eat healthily, be physically active and reduce alcohol consumption during COVID-19 restrictions.

**Results**
Move More April reached over 107,130 people and the LiveLighter® webpage promoting the campaign had 4,865 unique page views. A Move More April calendar resource housed on this webpage was downloaded 874 times.

Healthy At Home campaign results will be presented at the conference.

**Conclusions**
Health promotion campaigns tackling complicated lifestyle-related risk factors such as overweight and obesity need to be sustained over a long period to be effective. Pivoting campaign messages to remain relevant in times when usual habits are disrupted is critical to achieving long-term success.
Assessing the acceptability and barriers to digital health education for culturally and linguistically diverse (CALD) communities, when designing effective digital education.

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Research indicates digital-based learning has improved access and reach for health education. However, is this the same for people from culturally and linguistically diverse (CALD) communities? Do they experience barriers to online education?

Aim: To assess the acceptability and barriers to digital learning for people from Mandarin, Cantonese, Greek, Vietnamese, Bengali and Nepali speaking communities, when designing effective digital diabetes-specific health education.

Methods: A literature review to identify elements of successful digital initiatives, as well as community consultations exploring current preferences were performed. Semi-structured interviews and surveys were conducted with health professionals, community leaders and other community members from six language groups. Community members were asked about their preferences for digital learning. Health professionals and community leaders were interviewed to explore the effectiveness of online delivery of diabetes education.

Results: A total of 157 responses were analysed (118 online surveys and 39 semi-structured interviews). While there were some common trends, preferences and barriers to digital education varied between the different language groups. Common barriers included access, affordability, privacy and literacy concerns. Results indicated that:

- paper-based information was preferred (n=79) digital options such as videos (n=50) or pre-recorded webinars (n=39) were favoured over live webinars (n=28)
- more than half of survey respondents were confident using the internet to access a health program (n=72)
- Chinese (n=66) and Vietnamese (n=33) were the most common languages spoken by respondents
- less than half of those surveyed had an email address (n=58).

Key insights included the importance of co-designing online programs with each of the language groups. Common traits for successful programs included in-language information, flexible timing, familiar platforms, privacy measures and community leader involvement.

Conclusion: Digital-based learning programs may be a suitable adjunct to face-to-face education. The first step, however, should be consultation with the targeted community to acknowledge their digital learning and access preferences.

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Longitudinal weight gain and lifestyle factors in women with and without polycystic ovary syndrome

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Background: While women with polycystic ovary syndrome (PCOS) have a higher prevalence of overweight/obesity and increased weight gain than women without PCOS, the independent association of lifestyle behaviours (diet, physical activity and sitting time) with weight change is not known.

Methods: We used data from the 1973-78 cohort of the Australian Longitudinal Study on Women’s Health for longitudinal analysis of data collected over 19 years. Linear mixed-effects models were used to examine weight change and its association with lifestyle factors, adjusted for sociodemographic, psychological factors and health care utilisation.

Results: Women with PCOS gained more weight annually (0.27 kg/year, 95% CI 0.14, 0.40; P<0.001) and over 19 years than women without PCOS (0.69 kg, 95% CI 0.37, 1.01). There was a significant three-way interaction between energy intake (0.31 kg, 95% CI 0.004, 0.61; P=0.047), glycaemic index (0.44 kg, 95% CI 0.13, 0.74; P = 0.005), sitting time (0.55 kg 95% CI 0.002, 1.10; P=0.048), physical activity (-0.37 kg, 95% CI -0.69, -0.05; P=0.022) and PCOS and time. While women with PCOS had higher weight gain than those without PCOS both for the groups with better and worse lifestyle behaviours, the magnitude of this difference was greater for women with PCOS who had higher energy intake, glycaemic index and longer sitting time and those not meeting PA guidelines.

Conclusions: Women with PCOS had a higher rate of weight gain than those without PCOS. Women with PCOS and with higher energy, increased glycaemic index, longer sitting time and insufficient PA had the greatest weight gain. This may suggest that women with PCOS are biologically predisposed to weight gain when experiencing adverse lifestyle factors. The findings also reinforce the contribution of lifestyle factors to weight change in women with PCOS and the importance of early lifestyle intervention.

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The making of an ad – formative research to inform the LiveLighter® campaign

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LiveLighter® is a TV-led healthy lifestyle campaign funded by the WA Department of Health and implemented by Cancer Council WA, which aims to reduce the rates of overweight and obesity amongst WA adults. In 2019 Cancer Council WA commissioned MMResearch to undertake qualitative research to provide insights for the development of the next stage of social marketing for the LiveLighter® campaign and ensure messaging is appropriate for the target audience.

Methods

A cross-sectional study design was employed. Participants attending at least six sessions (Introductory Session/baseline and Sessions 1-5) between 1 July 2019 and 1 August 2020 were included. Socio-demographic information was collected at baseline. Outcome data were collected at baseline, Session 5 (6 months) and 12-month Session. Outcome measures included mean fat/fibre score, physical activity minutes/day, weight, waist circumference, and diastolic and systolic blood pressure. Paired t tests and repeated-measures analyses were conducted to examine changes in participant outcomes over 6 and 12 months. p<0.05 was accepted as statistically significant.

Results

In total 1359 participants completed Session 5 and 122 completed 12-month Session. The mean (SD) age of the participants was 62.7 (14.2) years and over 70% (n=995) were women. Group Course (n=1053) and THC (n=306) participants were different regarding the socio-demographic information examined. They had statistically significant improvements in all outcomes from baseline to Session 5, such as increased physical activity minutes (9.0 vs. 22.4), weight loss (kg) (1.7 vs. 3.0), and reduced systolic blood pressure (mmHg) (1.7 vs. 1.6). Further, both groups of participants maintained the outcomes from six to 12 months.

Conclusions

The evaluation findings demonstrate the effects of the Life! program on participants’ behavioural, physical and bio-medical outcomes. The findings provide sound evidence of the value of continuing to deliver the program to individuals with risk of type 2 diabetes and CVD.
Aims
Improving physical activity and reducing sedentary behaviour represent important areas for obesity prevention intervention. We aimed to determine the cost-effectiveness of a multi-arm primary school-based intervention (Transform-Us!) to increase physical activity and/or reduce sedentary time in 8-9 year old children.

Methods
Results from a cluster-randomised trial undertaken with children from 20 primary schools in Melbourne, Australia (Transform-Us!) were used to estimate cost-effectiveness from a public-payer perspective. Participants were randomised by school to a: (i) sedentary behavior arm (SB-I), (ii) physical activity arm (PA-I), (iii) combined arm (SB+PA-I); or (iv) control arm. Costs, differences in body mass index z-score and sedentary time at 30 months were calculated for the within-trial population. Results were extrapolated to estimate the costs and outcomes of the intervention if delivered to all 8-9 year old children attending Australian Government primary schools. A validated multi-state multiple-cohort lifetable model was used to estimate the obesity and physical activity-related health outcomes and healthcare cost-savings over the lifetime of the 2010 Australian population. Results were reported as health-adjusted life years (HALYs) saved and healthcare cost-savings of diseases averted.

Results
Within-trial cost-effectiveness results demonstrated that, when compared to control schools, the PA-I and SB-I intervention arms were “dominant”, resulting in net health benefits and healthcare cost-savings if intervention effects were maintained. When the costs and effects of these intervention arms were extrapolated, results suggested significant potential as obesity prevention measures (PA-I: 60,780 HALYs saved, healthcare cost-savings AUD641M; SB-I: 61,989 HALYs saved, healthcare cost-savings AUD661M). Cost-effectiveness of the SB+PA-I intervention was not estimated, as there was no statistically significant difference in either BMI or sedentary time.

Conclusion
The PA-I and SB-I Transform-Us! intervention arms represent good value for money and could lead to health benefits and healthcare cost-savings related to the prevention of chronic disease in later life.

Association between dietary inflammatory index, dietary patterns, plant-based dietary index and the risk of obesity in Australian adults

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Enablers and barriers to women’s lifestyle behaviour change during the preconception period: A systematic review

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Enablers and barriers to women’s lifestyle behaviour change during the preconception period: A systematic review

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Aim: Healthy lifestyle behaviours during the preconception period are important to optimise pregnancy, birth, and child outcomes. However, the majority of women do not adhere to lifestyle recommendations and 50% of Australian women enter pregnancy with overweight or obesity. The aim of this study was to conduct a systematic review exploring the barriers and enablers to women’s preconception lifestyle behaviours.

Method: Medline, EMBASE, PsycINFO, and CINAHL databases were searched for peer-reviewed, quantitative and qualitative studies (in English, 2006-2020) of preconception women (including women who were planning a pregnancy, interconception, pregnant and postpartum where preconception behaviours were retrospectively assessed, and of reproductive age). Lifestyle behaviours included diet, physical activity, smoking, alcohol use, and supplement intake (folic acid, iodine, and multivitamins). The Theoretical Domains Framework (TDF) and Capability, Opportunity, Motivation, Behaviour (COM-B) model were used to identify and synthesise the barriers and enablers of preconception lifestyle behaviour change.

Results: Forty studies (out of 3402) were included, assessing diet (n=8), physical activity (n=3), alcohol use (n=7), smoking (n=8), and supplement use (n=34). TDF domains identified were knowledge, beliefs about capabilities, beliefs about consequences, goals, intentions, and social support. Lack of knowledge on practising healthy behaviours were the most common
Interrelated factors of disordered eating and obesity in pregnancy and postpartum and implications for early parenting

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Background: The pregnancy and postpartum life stages expose women to increased obesity risk. The perinatal period is also a high-risk period for the development or relapse of disordered eating (DE) behaviours, including eating disorders. Recent conceptual advances linking modifiable perinatal maternal and early childhood obesity risk factors have specifically highlighted the importance of assessing maternal body image and eating issues for improving mothers’ own health outcomes as well as for establishing high-quality early mother-child interactions involved in promoting optimal child development. However, there is scarce research knowledge of interrelated factors involved in the development and maintenance of DE and obesity in pregnancy and postpartum.

Aim: The overall aim of this narrative review was to synthesise and summarise DE and obesity in pregnancy and postpartum research knowledge to better inform perinatal and early parenting healthy lifestyle care.

Results: The review showed: 1. DE is both an important risk and a perpetuating factor for obesity, often connected through aspects of psychological health, such as low mood or negative affect; 2. Weight and DE stigma are barriers to receiving optimal health care in pregnancy and postpartum; and 3. Psychosocial aspects of DE and obesity may pose additional challenges to optimising early dyadic mother-child interactions implicated in healthy child weight development.

Conclusion: The complexity surrounding DE and obesity is often compounded by physical and psychological changes experienced during pregnancy and postpartum, particularly for women with history of trauma. Weight and DE stigma may prevent women from disclosing their symptoms, and health professionals do not always know how to identify DE. This evidence highlights opportunities for supporting women, to not just improve healthy lifestyle behaviours, but to also address vital underlying psychosocial factors implicated in eating behaviour and weight patterns, and the way that mothers experience the commencement of their parenting journey.


Longitudinal trends in behavioural profiles and adiposity in school children

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Aims

Diet, physical activity, sedentary behaviour and sleep, are typically considered individually as predictors of health. Identifying integrated profiles of these behaviours may help understand and evaluate their associations with adiposity. This study aimed to investigate longitudinal associations between behavioural profiles and adiposity in school children.

Methods

Data were from the second (W2; 2011/12; 6-8y, n=432) and third (W3; 2012/13; 9-11y, n=445) waves of the HAPPY cohort. Measures of diet and sleep (parent report), physical activity and sedentary behaviour (parent report and accelerometry) were included in latent profile analysis to derive behavioural profiles. Researchers measured height and weight (to calculate body mass index [BMI] z-scores) and waist circumference. Parents reported their highest level of schooling and child age and sex. Linear regression models (adjusted for child age, sex, parent education and W2 adiposity) tested associations between derived behavioural profiles at W2 and adiposity at W2 and W3.

Results
A three-profile model was identified, with behavioural profiles labelled ‘unhealthy’ (n=206; poor sleep and fruit and vegetable consumption, low physical activity, high sedentary behaviour), ‘active healthy-eaters’ (n=84; high outdoor play and fruit and vegetable intake), and ‘healthy movement unhealthy eaters’ (n=141; high sleep and physical activity, low sedentary behaviour, mixed diet). Cross-sectionally there was little evidence of associations between profiles and adiposity. Longitudinally, children demonstrating the active healthy-eaters profile (β=0.18, 95% CI 0.04, 0.32) had higher BMI z-scores at W3 compared to children with the unhealthy profile. No other associations were found.

Conclusions

Children exhibited healthy, unhealthy and mixed behavioural profiles indicating that behaviours cluster non-uniformly in different sub-groups of children. This emphasises the need to consider behavioural profiles over individual behaviours to understand and address the complex nature of adiposity. Examining the prospective influence of behavioural profiles on adiposity and planning comprehensive multiple behaviours interventions are key to tackling this issue.

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**A systematic review of economic evaluations of health-promoting retail-based interventions**

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**Background:** Given the role of food retail environments in shaping population diet, interventions in retail settings can potentially have significant impacts on obesity prevalence. Whilst retail interventions aimed at improving the healthiness of food environments is increasing, the evidence related to the cost-effectiveness of these interventions is limited. This review investigated the (i) evidence of cost-effectiveness of health-promoting retail interventions and (ii) key assumptions adopted in these evaluations.

**Methods:** A narrative review of published academic studies across fourteen databases was undertaken (CRD42020153763). Eligible studies were identified, analysed, and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis.

**Results:** Seven studies that evaluated ten retail interventions were included. There were six cost-effectiveness analyses (CEA) and five cost-utility analyses (CUA), including one intervention which was evaluated using both frameworks. The interventions were undertaken in Australia (n=7), the USA (n=2), and England (n=1). Retail-based interventions were implemented at community stores (n=4), supermarkets (n=3), restaurants (n=2) and schools (n=1). Types of intervention varied, including price discounts, menu labeling, in-store nutrition education, and trans-fat regulations. Common outcomes reported in the CEAs were cost per healthy food item purchased/served, life year gained and death prevented. Common outcomes reported in CUAs were cost per disability and quality-adjusted life year (DALY/QALY) gained. Three of the five CUAs concluded that retail interventions were cost-effective with incremental cost-effectiveness ratios ranging from A$2020 5,548 to A$2020 5,615 per DALY/QALY gained. Most studies omitted assumptions regarding compensatory behaviour (i.e. consumption of food that was not targeted by the intervention and food purchase from outlets other than the intervention) and presumed that sales data was indicative of consumption.

**Conclusion:** Food retail interventions are likely to be cost-effective, however, to improve the accuracy of findings, additional data is required to inform assumptions related to compensatory behaviour and the relationship between sales data and consumption.

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**Meals ordered online for delivery and other lifestyle behaviours during the COVID-19**

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**Context and aim:** In response to the pandemic the Australian Government introduced social distancing and isolation measures, including temporary closure of restaurants and cafes (except from takeaway and delivery services), and other non-essential business, which potentially influenced lifestyle behaviours (e.g., eating and exercise habits) of many Australians. The current study will assess West Australian adults’ meals ordering for home delivery and other health-related behaviours and lifestyle changes during the COVID-19 ‘stay at home’ period.

**Methods:** Approximately 150 West Australian adults aged 18+ years will complete an online survey from end of June to end of August 2020. Respondents will report on the frequency with which they ordered meals online for home delivery or collected takeaway meals during the COVID-19 lockdown, as well as the meal type they usually order using these online platforms. Respondents will report on their intake of vegetable, fruit, and sugary drinks as well as time spent engaging in moderate-to-vigorous physical activity, and describe whether the COVID-19 lockdown period influenced any changes in these health-related lifestyle behaviours.

**Results:** Findings from quantitative and open ended responses will be presented. The outcomes of this research will offer a unique understanding of potential changes in Western Australian’s behavioural changes related to meals ordering online for home delivery, exercise and related lifestyle behaviours during the COVID-19 pandemic.
Conclusion: This research will give insight into how West Australians responded to COVID-19 in the context of health-related lifestyle behaviours; and learn which factors affected respondents to change their health-related lifestyle behaviours during the pandemic. The outcomes of the study will be used to inform future public health interventions and advocacy for policies that encourage individuals to adopt healthy lifestyle behaviours during national and international health emergencies, such as the current COVID-19 pandemic.

Ultra-processed food and chronic non-communicable diseases: A systematic review and meta-analysis of 43 observational studies

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Anatomy of Project ECHO® for preventing and treating childhood obesity in Queensland, Australia.

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The beginning
In 2017-19, one quarter (24.9%) of children were living with overweight or obesity (OW/OB). Health professionals in primary care view paediatric weight management as part of their role, however, only a small proportion regularly provide evidence-based counselling. Project ECHO® was identified by Children’s Health Queensland Hospital and Health Service (CHQ) as a model to drive education and training statewide. In 2017, CHQ partnered with statewide clinical, health promotion and academic organisations – the Queensland Child and Youth Clinical Network, Preventive Health Branch and The University of Queensland (UQ) - to conduct the first Childhood OW/OB Project ECHO® series in Australia. A multidisciplinary team co-designed and delivered six series upskilling health professionals across Queensland, with a total of 519 separate attendances over more than 40 sessions.

Working together
Partnership with UQ increased capacity for health services implementation research. Participants completed an online questionnaire pre and post course completion. Results demonstrated significant improvements in attitudes, confidence and practice behaviours, including feeling qualified to treat and manage children (p=0.002), and an increased ability to: counsel and empower children and families (p=0.001), identify and address obstacles/barriers to change (p=0.003) and initiate appropriate follow up (p=0.017).

A move
Health and Wellbeing Queensland (HWQld) was established in July 2019 as Queensland’s first independent statutory government agency. With a vision that ‘every Queenslander achieves and sustains a healthier weight by moving more and making healthier food and drink choices’ an opportunity arose for HWQld to become a new Project ECHO® hub and continue the Childhood OW/OB series. UQ continues to be a research partner, with processes refined to ensure maximum participant engagement.

Next steps
The team at HWQld have just completed their first series, engaging a total of 29 health professionals. Plans are being made to explore reach into different target groups, including Indigenous Australians.

Patterns of change in lifestyle behaviours following childbirth

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Background
Modifiable lifestyle behaviours are strongly linked to chronic diseases causing a significant burden to public health. Lifestyle behaviours may worsen following childbirth due to a range of factors including a reduced prioritisation of health and time availability.

Methods
Longitudinal data from surveys 3 and 5 (ages 25-30 and 31-36 years) from the 1973-8 birth cohort of the Australian Longitudinal Study on Women’s Health that commenced in 1996 were used. We assessed changes in weight, energy intake, diet quality (measured using the dietary guidelines index), physical activity and sitting time in women who were nulliparous at survey 3 using multivariable linear regression models.

Results
Of 4927 nulliparous women at survey 3, 2503 were parous by survey 5. Mean weight change between surveys 3 and 5 was not statistically different between nulliparous (3.6±8.4kg) and parous (3.9±7.5kg) women (p=0.19). With each additional child, women had increased energy intake (381.34kJ, 95%CI 313.95, 448.74), decreased diet quality (-0.45unit, 95%CI -0.78, -0.12), lower physical activity (-122.45METmin/day, 95%CI -157.16, -87.73) and less sitting time (-1.03hrs/day, 95%CI -1.11, -0.94) after adjusting for the endpoints at baseline, age, BMI, education level, marital status, socioeconomic status, smoking status, alcohol frequency and stress.

Conclusion
With each additional child, Australian women have higher energy intake, poorer diet quality, lower physical activity and less sitting time, which does not translate to a difference in weight compared to nulliparous women. There is a worsening in some lifestyle behaviours with each additional child despite no differences in weight change over 6 years.

Feasibility of culturally adapting the Healthy Beginnings program for early obesity prevention

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Background: Healthy Beginnings is an established program in Sydney, Australia, that targets risk factors for obesity in early childhood (feeding practices, nutrition and active play). There is a large migrant population in Sydney, and investment to reach culturally and linguistically diverse communities is needed. This study aimed to assess the feasibility of implementing the culturally adapted Healthy Beginnings for Arabic- and Chinese-speaking communities.

Methods: The culturally adapted program was piloted with Arabic- and Chinese-speaking women from their third trimester until their baby was aged 6 months. At four staged time-points, the participants received culturally adapted written materials (text messages and booklets) and support phone calls from nurses. Key program messages related to breastfeeding, best-practice milk feeding, complementary feeding and active play. Feasibility was assessed using participant demographics and administrative data (recruitment, retention and number of nurse calls received).

Results: At baseline, 94 Arabic- and 69 Chinese-speaking mothers in Sydney were recruited. Chinese speaking mothers, compared to Arabic speaking mothers, reported having higher levels of employment and University-level education. More first-time mothers were recruited among the Chinese-speaking mothers (45, 65%) compared to Arabic-speaking mothers (21, 22%). At 6 months, the post-intervention survey was completed by 70 (74%) Arabic and 65 (94%) Chinese-speaking mothers. More of the Chinese speaking-mothers completed 75% of the nurse calls (38, 55%) compared with the Arabic speaking mothers (21, 24%).

Conclusion: The findings indicate feasibility of implementing the culturally adapted Healthy Beginnings among Arabic- and Chinese-speaking communities. Acceptability among mothers and potential refinements to enhance engagement, particularly among Arabic-speaking mothers, will be explored to complement these feasibility indicators. The culturally adapted Healthy Beginnings program shows potential for scale-up and would aim to reduce inequalities and support culturally and linguistically diverse families in the early prevention of obesity.
“It defeats the purpose of what sport is all about”: perspectives on fast food, gambling, and alcohol sponsorship in elite sport from Australian sporting fans

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Aim:
To explore adults’ perceptions of sponsorship of unhealthy food, alcohol and gambling products (‘unhealthy commodities’) in elite sport, acceptability of policy options to restrict them, and who was responsible for enacting them.

Methods:
Two sets of four focus groups were conducted in Sydney CBD and Western suburbs. Seven to eight participants were recruited for each group, to provide a range of age, gender, and socioeconomic status. The first four focus groups explored broad marketing to children concepts, focusing on unhealthy food and beverages, and identified specific areas of focus for the next round. The second set of four focus groups explored in detail perspectives of sport sponsorship of unhealthy food, alcohol and gambling, and policy options to restrict them, as themes arising from the first set, and targeted recruitment to frequent sport spectators, including parents and non-parents.

Results:
Participants recognised the commercial benefit of sport sponsorship, while noting the incongruity of associating unhealthy commodities with elite sport. Support for restricting sponsorship was closely tied to the perceived harm of product, with gambling viewed as having the most negative health impacts, followed by alcohol and fast-food. Sport sponsorship and sport marketing was more persuasive now than ever before, due to the integration of advertisements into broadcasted sport, and immediate access of fast-food or betting through mobile applications. There was greater support for policy measures that reduced the exposure of unhealthy commodities to at-risk groups (i.e. children), rather than banning particular products altogether. Responsibility of enacting changes sat with the government and sports associations.

Conclusion:
Australian sport spectators were supportive of policies that limited the exposure of children to gambling, fast-food and alcohol through sport sponsorship. Participants were concerned about the persuasiveness of marketing and harms that may arise from the behaviours encouraged by marketing, particularly from gambling.