

Sitting Less AND Moving More – A Contemporary Approach to Chronic Disease Prevention and Management

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Regular exercise is good for us – in many ways



- ✓ Improved cardiorespiratory and muscular fitness
- ✓ Lower risk of type 2 diabetes
- ✓ Lower risk of metabolic syndrome
- ✓ Lower risk of early death

≥ 150 min/week moderate/vigorous PA = **ACTIVE**

< 150 min/week moderate/vigorous PA = **INSUFFICIENTLY ACTIVE**

Chronic Disease: Australia's Biggest Health Challenge

- * Arthritis
- * Asthma
- * Back pain and problems
- * Cancer
- * Cardiovascular disease (CVD)
- * Chronic obstructive pulmonary disease
- * Diabetes
- * Mental health conditions

Source: AIHW: Australia's Health 2016 Fact Sheet

Quick facts

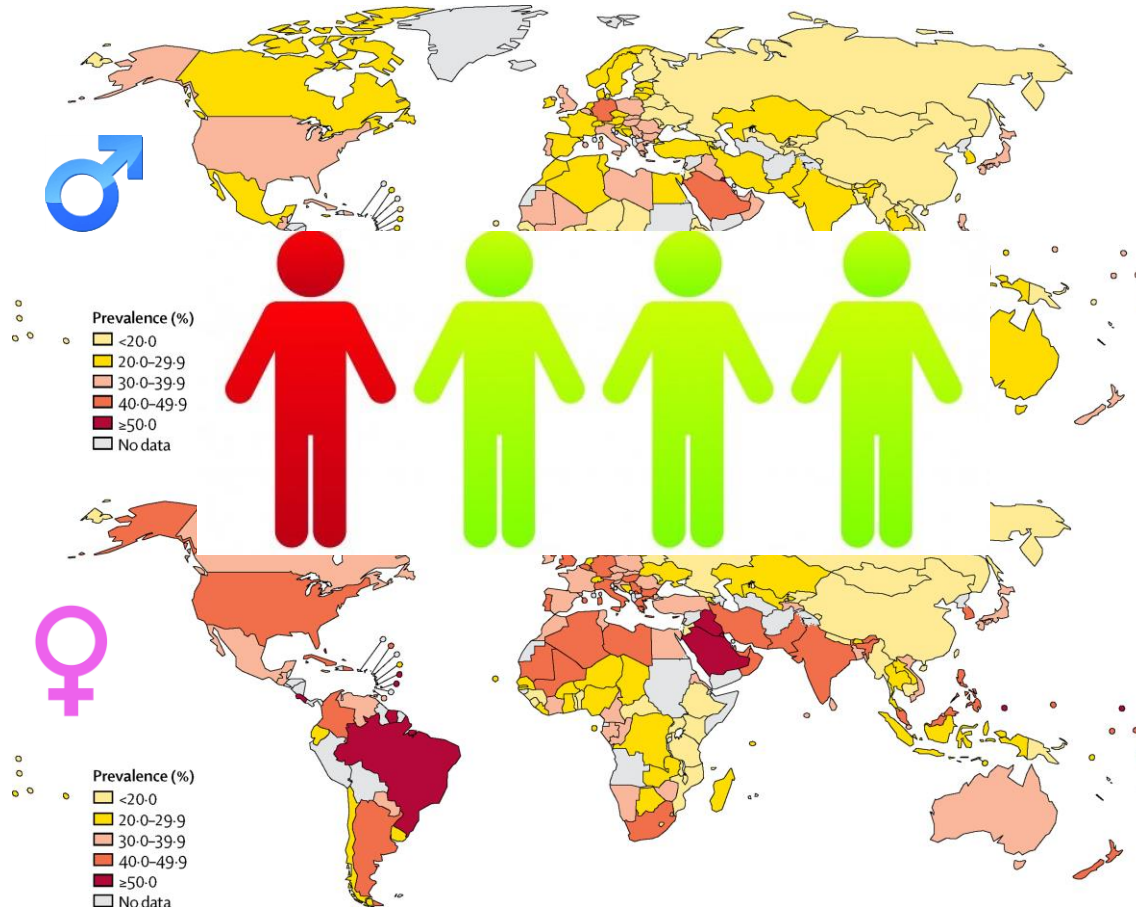
In 2014–15, more than **11 million** Australians had at least one of eight selected chronic diseases.

Chronic diseases are associated with:

- more than **7 in 10** deaths
- around **1 in 3** problems managed in general practice
- more than **1 in 3** potentially preventable hospitalisations.

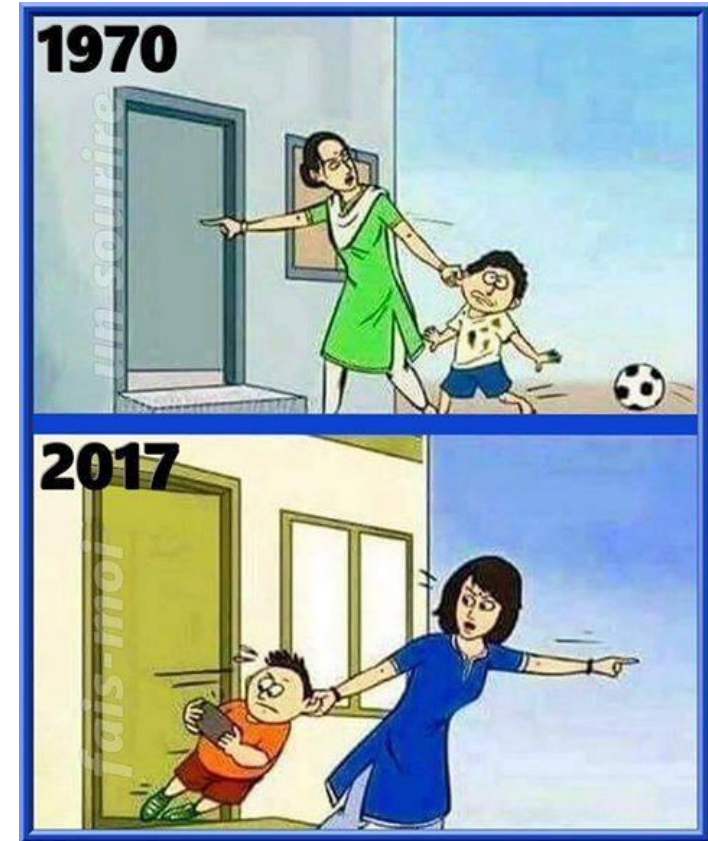
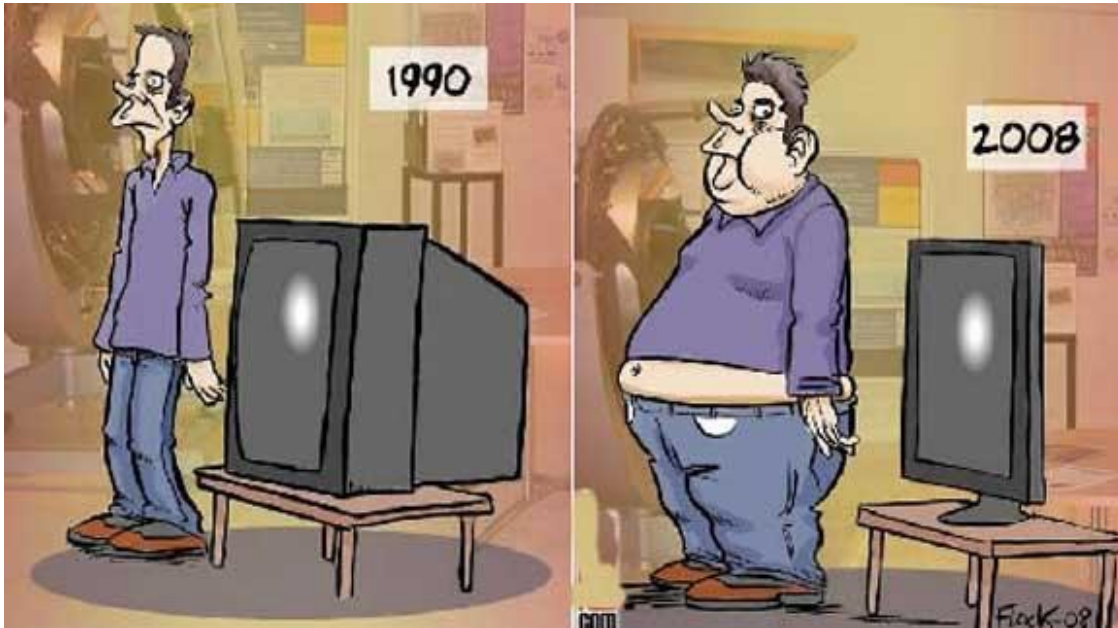
Almost **1 in 3** (29%) people aged 65 and over report having three or more chronic diseases, compared with 2.4% of people aged under 45.

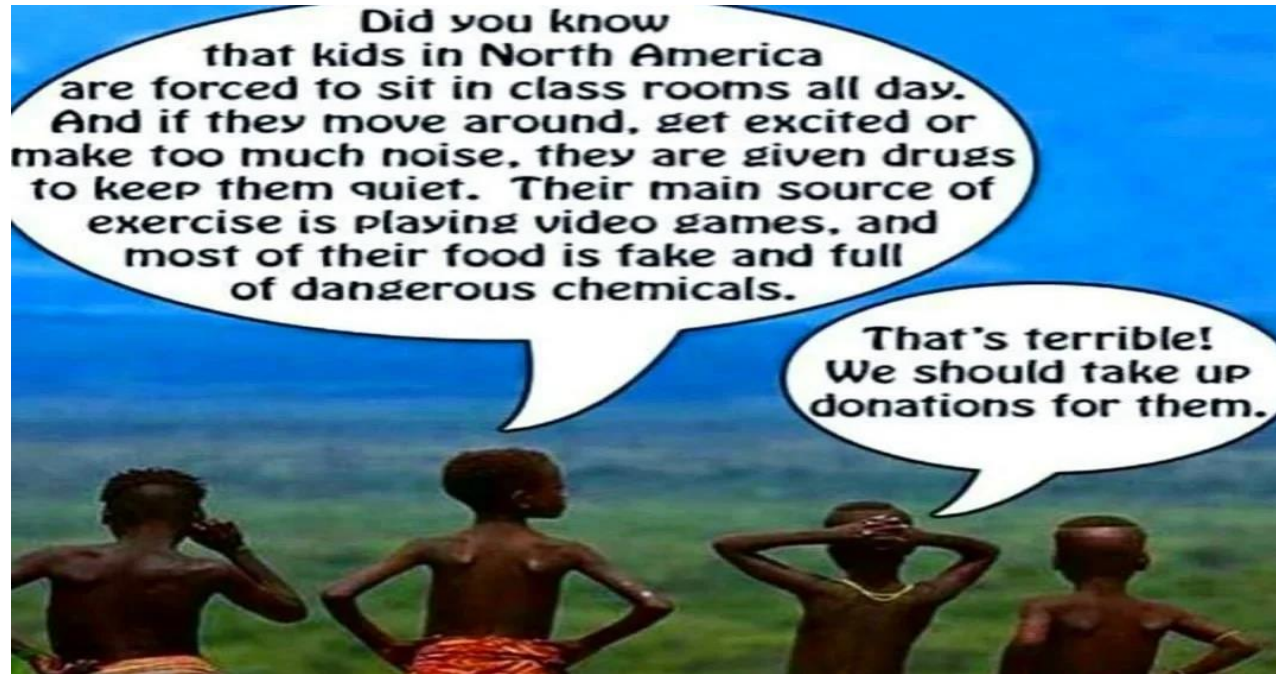
Global prevalence of insufficient PA – World Health Organization 2018



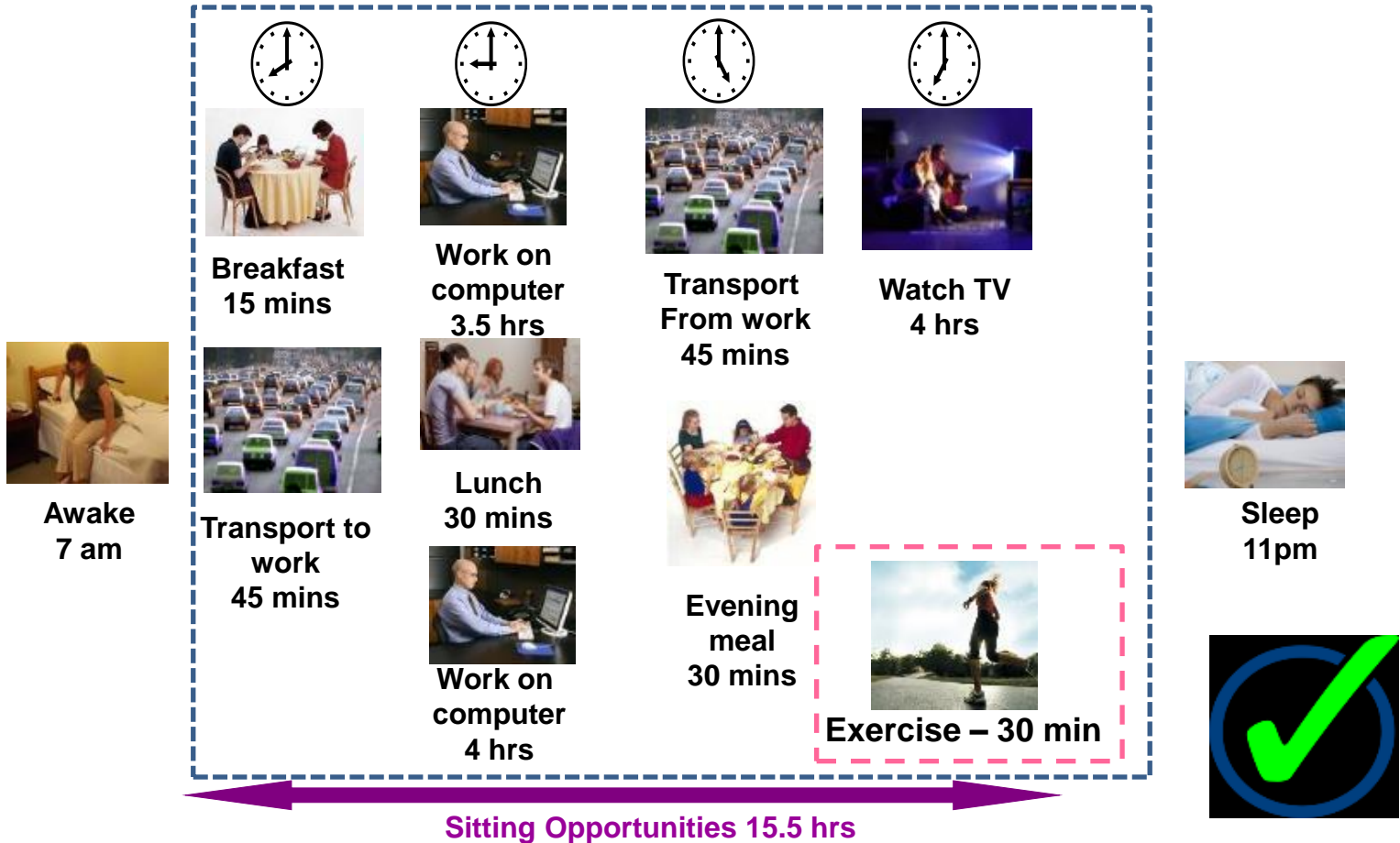
Source: Guthold R. *et al.*
Lancet Global Health
Published online: 4/09/18

Our Changing World

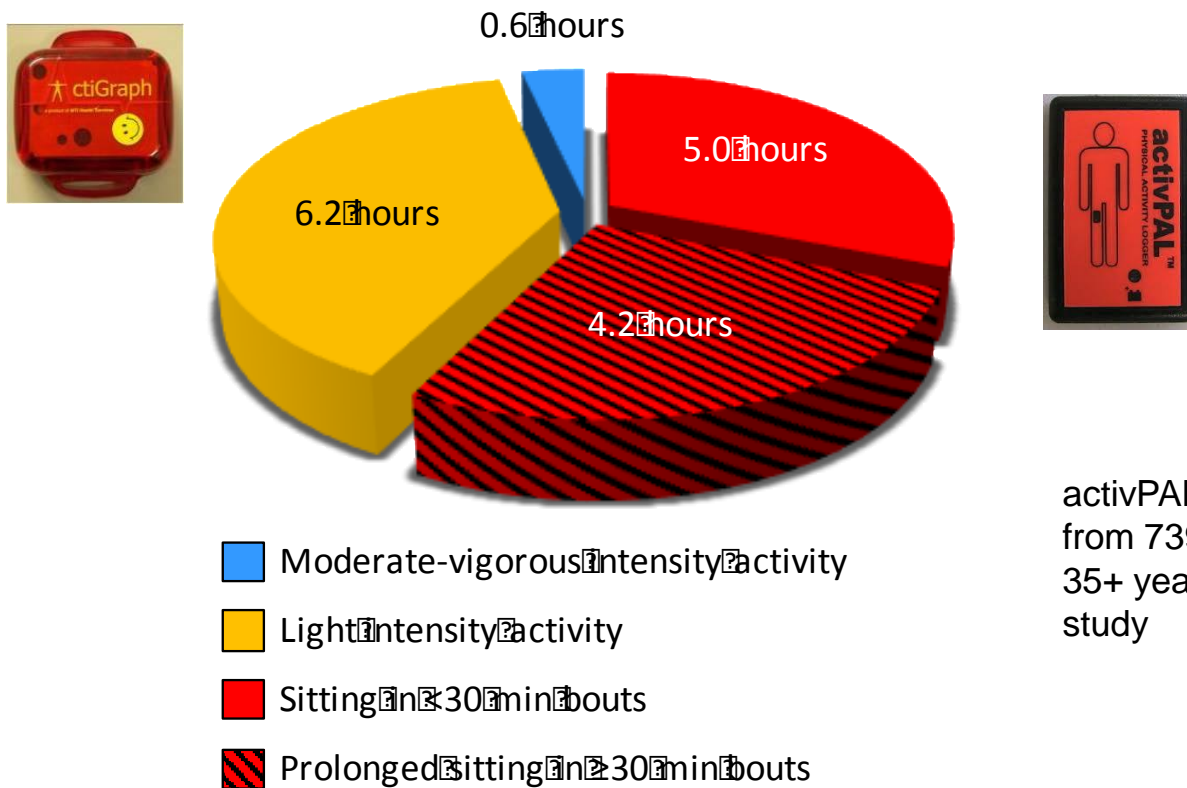




Our modern sitting-oriented society



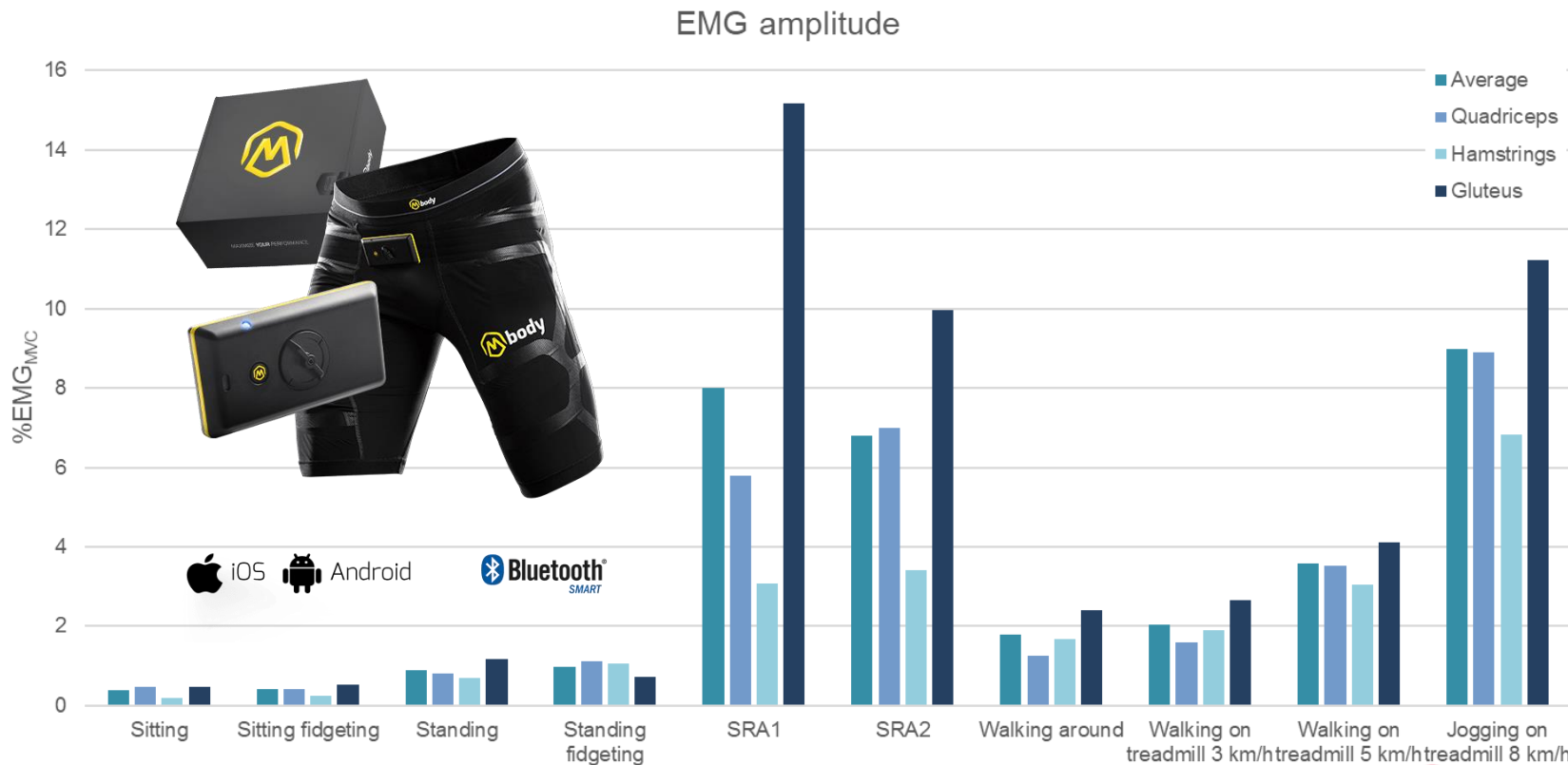
Fast Fact # 1: Sitting is now the predominant waking behaviour



activPAL3 and Actigraph data from 739 Australian adults aged 35+ years from the AusDiab3 study

Source: Healy *et al.* 2015 *Eur Heart J* 36 (39) 2643-9

Fast Fact # 2: **Sitting = minimal skeletal muscle activity**



Special thanks: Dr Arto Pesola and Christian Brakenridge

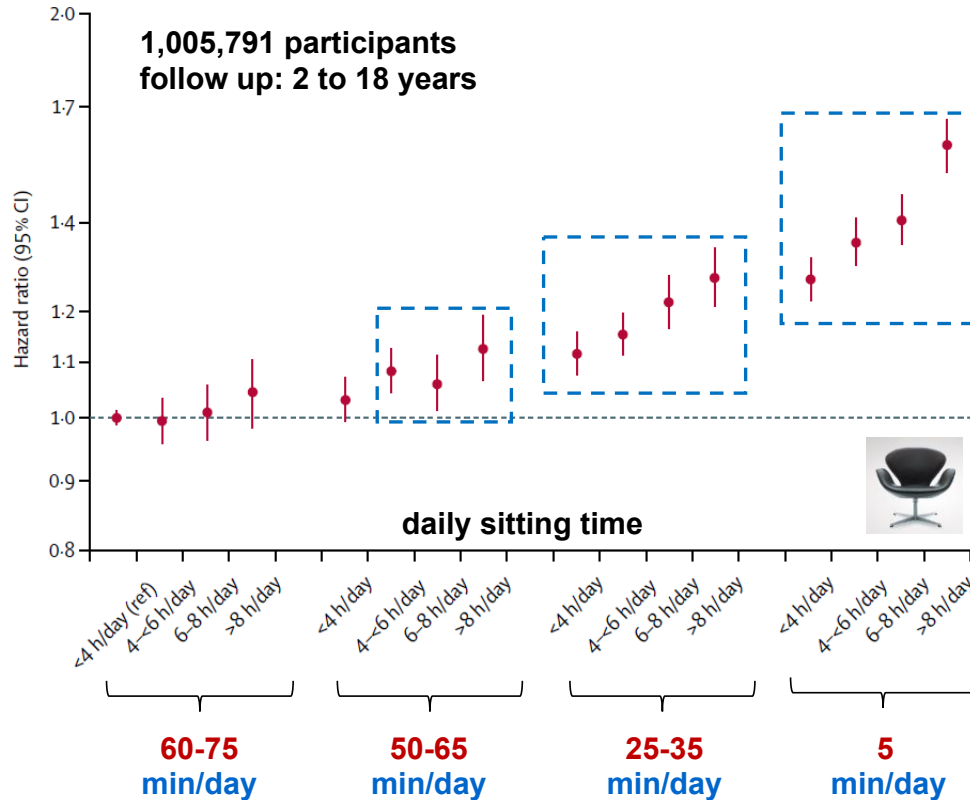
Fast Fact #3: **High sitting is associated with increased risk of chronic diseases**

Health Outcome	Level of evidence for association	Level of evidence for dose-response	Level of evidence for variation in association by physical activity
All-cause mortality	Strong	Strong	Strong
CVD mortality	Strong	Strong	Moderate
Cancer mortality	Limited	Limited	Not assignable
Incident T2D	Strong	Limited	Not assignable
Weight status	Limited	Limited	Not assignable
Incident CVD	Strong	Strong	Not assignable
Incident cancer	Moderate	Limited	Not assignable



Source: US 2018 Physical Activity Guidelines Advisory Committee Scientific Report:
<https://health.gov/paguidelines/second-edition/report.aspx>

Fast Fact # 4: Only very high levels of exercise provide protection



Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women

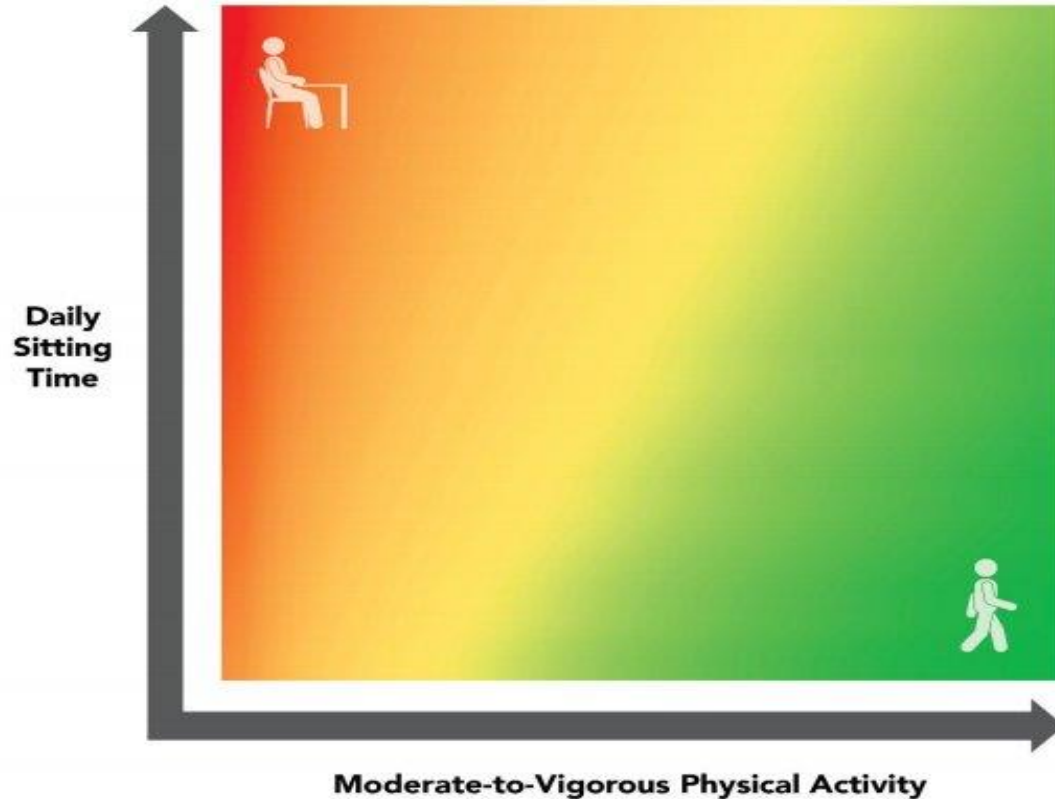
Ulf Ekelund, Jostein Steene-Johannessen, Wendy J Brown, Morten Wang Fagerland, Neville Owen, Kenneth E Powell, Adrian Bauman, I-Min Lee, for the Lancet Physical Activity Series 2 Executive Committee* and the Lancet Sedentary Behaviour Working Group*

Ekelund *et al.* 2016 *The Lancet* 388: 1302-10

Sitting time, physical activity and mortality



Figure D-2. Relationship Among Moderate-to-Vigorous Physical Activity, Sitting Time, and Risk of All-Cause Mortality



*Thanks to Peter Katzmarzyk
(Pennington Biomedical
Research Centre) and US
Physical Activity Guidelines
Taskforce*

New Australian Public Health Guidelines (2014)



Australia's Physical Activity and Sedentary Behaviour Guidelines for Adults (18–64 years)

PHYSICAL ACTIVITY

- Doing any physical activity is better than doing none. If you currently do no physical activity, start by doing some, and gradually build up to the recommended amount.
- Be active on most, preferably all, days every week.
- Accumulate 150 to 300 minutes (2 ½ to 5 hours) of moderate intensity physical activity or 75 to 150 minutes (1 ¼ to 2 ½ hours) of vigorous intensity physical activity, or an equivalent combination of both moderate and vigorous activities, each week.
- Do muscle strengthening activities on at least 2 days each week.

SEDENTARY BEHAVIOUR

- Minimise the amount of time spent in prolonged sitting.
- Break up long periods of sitting as often as possible.

What are the feasible 'counter-measures'?

Don't just sit there!

We know sitting too much is bad, and most of us intuitively feel a little guilty after a long TV binge. But what exactly goes wrong in our bodies when we park ourselves for nearly eight hours per day, the average for a U.S. adult? Many things, say four experts, who detail a chain of problems from head to toe.

Illustration by Bonnie Brummett, Courtesy of Perseus Books

ORGAN DAMAGE

Heart disease
Muscles burn fat and blood flow more actively during a long sit, allowing fatty acids to more easily lodge in blood. Prolonged sitting has been linked to high blood pressure and elevated cholesterol, and people with the most sedentary lifestyles are more prone to heart disease than those who get up and move frequently.

Overproductive pancreas
The pancreas produces insulin, a hormone that enables glucose to enter the energy-rich muscle cells. In people who sit for long periods, the pancreas produces more insulin than needed, which can lead to diabetes. A 2008 study found that people who sit for long periods have a 10% higher risk of developing type 2 diabetes.

Cancer
Research is linking sitting to greater risk for colon, breast and endometrial cancers. The reason is unclear, but one theory is that sitting causes poor circulation and growth. Another is that sitting increases blood vessel inflammation that can lead to cancer—and probably cardiovascular—disease.

Joint problems
Sitting for long periods can lead to joint problems, including osteoarthritis and rheumatoid arthritis. The reason is unclear, but one theory is that sitting causes poor circulation and growth. Another is that sitting increases blood vessel inflammation that can lead to cancer—and probably cardiovascular—disease.

Muscle degradation
Many jobs
Most sitting jobs involve a lot of static, electronic equipment. When you sit, your muscles are in a state of atrophy. They are not working, and they are not getting the oxygen and nutrients they need to stay healthy. This can lead to muscle atrophy, which can cause joint problems and other health issues.

Tight hips
People who sit for long periods often have tight hips. This is because the hip flexors, which are the muscles that connect the hip to the knee, are in a state of atrophy. They are not working, and they are not getting the oxygen and nutrients they need to stay healthy. This can lead to muscle atrophy, which can cause joint problems and other health issues.

Lump glands
Sitting for long periods can lead to lump glands. This is because the lymphatic system, which is responsible for removing waste from the body, is in a state of atrophy. It is not working, and it is not getting the oxygen and nutrients it needs to stay healthy. This can lead to lump glands, which can cause joint problems and other health issues.

Leg disorders
Prolonged sitting can lead to leg disorders. This is because the blood flow to the legs is reduced when sitting. This can lead to leg cramps, numbness, and other health issues. It can also lead to deep vein thrombosis, which is a blood clot that can travel to the lungs and cause a pulmonary embolism.

Soft tissues
Sitting for long periods can lead to soft tissue damage. This is because the muscles and ligaments in the body are in a state of atrophy. They are not working, and they are not getting the oxygen and nutrients they need to stay healthy. This can lead to soft tissue damage, which can cause joint problems and other health issues.

Heart disease
Sitting for long periods can lead to heart disease. This is because the heart is not getting the oxygen and nutrients it needs to stay healthy. This can lead to heart disease, which can cause joint problems and other health issues.

Overweight
Sitting for long periods can lead to overweight. This is because the body is not burning enough calories. This can lead to overweight, which can cause joint problems and other health issues.

Diabetes
Sitting for long periods can lead to diabetes. This is because the pancreas is not producing enough insulin. This can lead to diabetes, which can cause joint problems and other health issues.

High blood pressure
Sitting for long periods can lead to high blood pressure. This is because the blood vessels are not getting the oxygen and nutrients they need to stay healthy. This can lead to high blood pressure, which can cause joint problems and other health issues.

Stroke
Sitting for long periods can lead to stroke. This is because the blood flow to the brain is reduced when sitting. This can lead to stroke, which can cause joint problems and other health issues.

Heart attack
Sitting for long periods can lead to heart attack. This is because the heart is not getting the oxygen and nutrients it needs to stay healthy. This can lead to heart attack, which can cause joint problems and other health issues.

Death
Sitting for long periods can lead to death. This is because the body is not getting the oxygen and nutrients it needs to stay healthy. This can lead to death, which can cause joint problems and other health issues.

Life expectancy
Sitting for long periods can lead to a shorter life expectancy. This is because the body is not getting the oxygen and nutrients it needs to stay healthy. This can lead to a shorter life expectancy, which can cause joint problems and other health issues.

Quality of life
Sitting for long periods can lead to a lower quality of life. This is because the body is not getting the oxygen and nutrients it needs to stay healthy. This can lead to a lower quality of life, which can cause joint problems and other health issues.

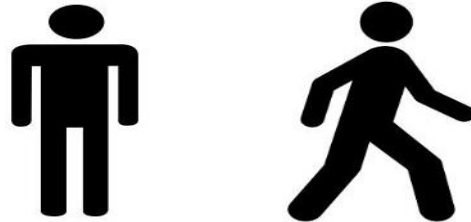
Healthcare costs
Sitting for long periods can lead to higher healthcare costs. This is because the body is not getting the oxygen and nutrients it needs to stay healthy. This can lead to higher healthcare costs, which can cause joint problems and other health issues.

Productivity
Sitting for long periods can lead to lower productivity. This is because the body is not getting the oxygen and nutrients it needs to stay healthy. This can lead to lower productivity, which can cause joint problems and other health issues.

Work-life balance
Sitting for long periods can lead to a poor work-life balance. This is because the body is not getting the oxygen and nutrients it needs to stay healthy. This can lead to a poor work-life balance, which can cause joint problems and other health issues.

Overall health
Sitting for long periods can lead to poor overall health. This is because the body is not getting the oxygen and nutrients it needs to stay healthy. This can lead to poor overall health, which can cause joint problems and other health issues.

Inactive (sitting)



Active (reduced or non-sitting)

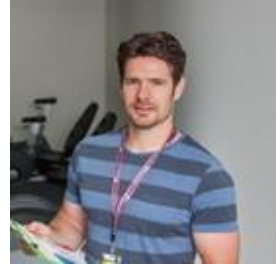
Solutions



Benefits for Type 2 Diabetes of Interrupting Prolonged Sitting with Brief Bouts of Light Walking or Simple Resistance Activities

PC Dempsey, RN Larsen, P Sethi, JW Sacre, NE Straznicky, ND Cohen, E Cerin, GW Lambert, N Owen, BA Kingwell, DW Dunstan

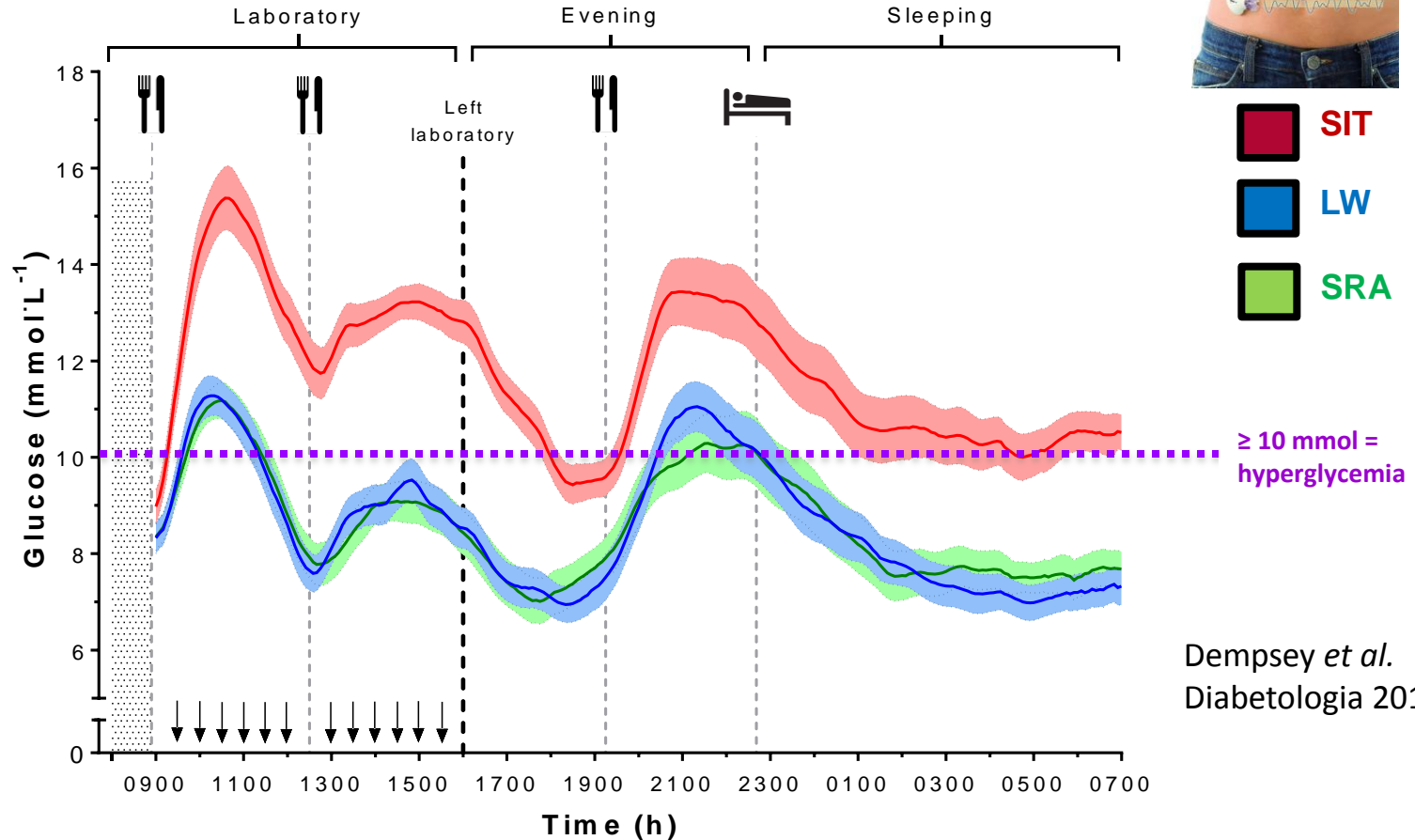
Diabetes Care (2016) 39: 964-72



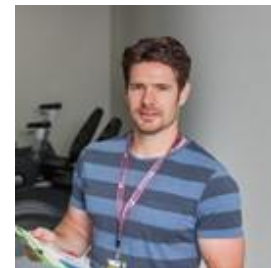
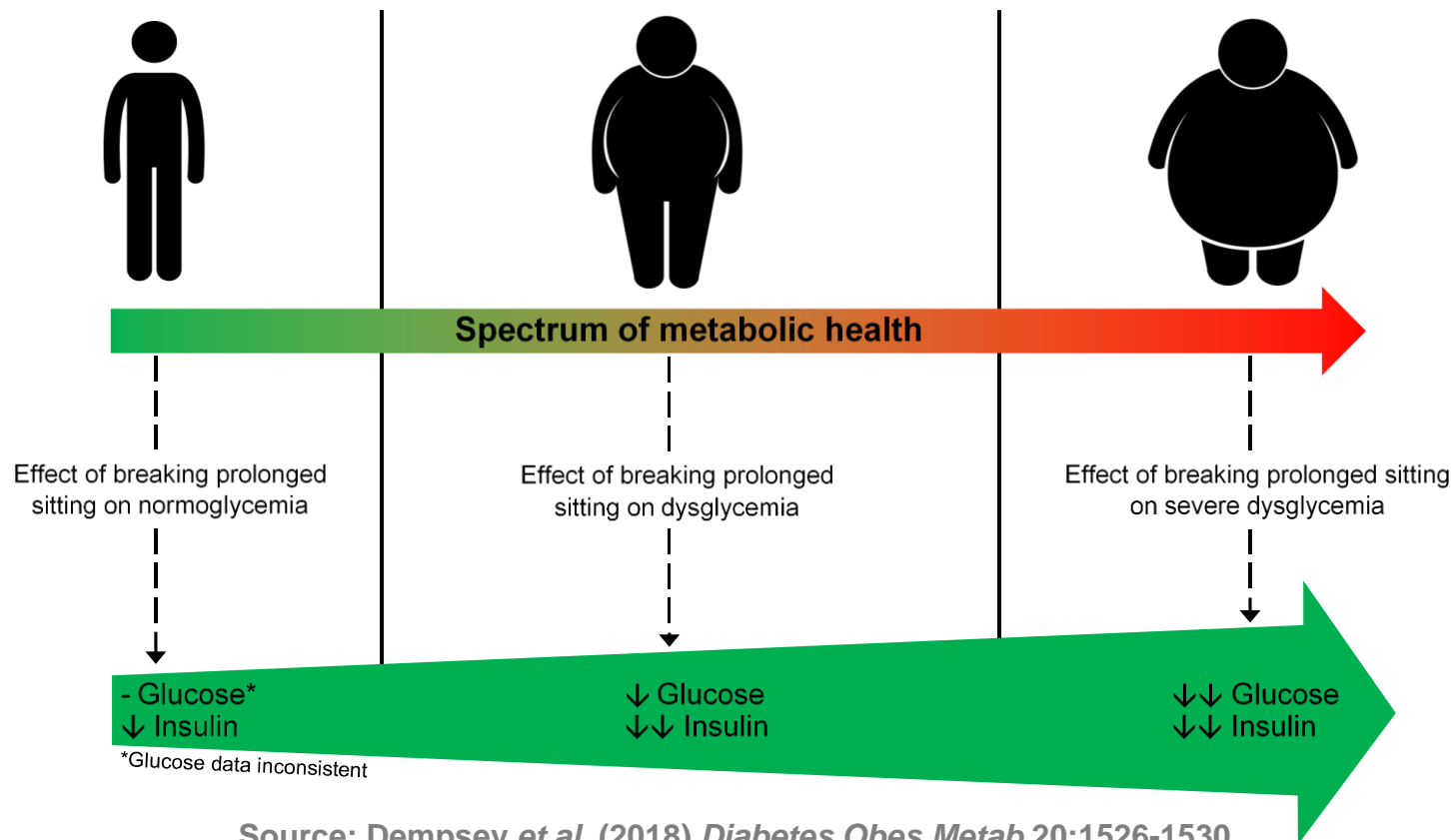
Paddy Dempsey



Results: ↓ hyperglycemia (CGM)



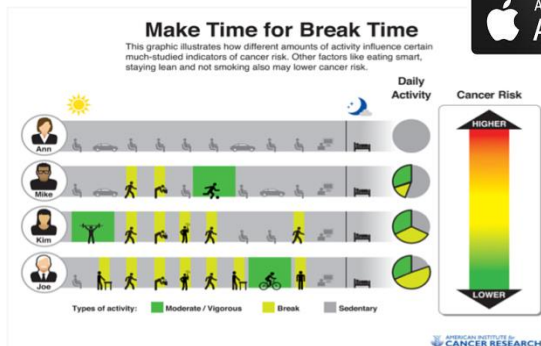
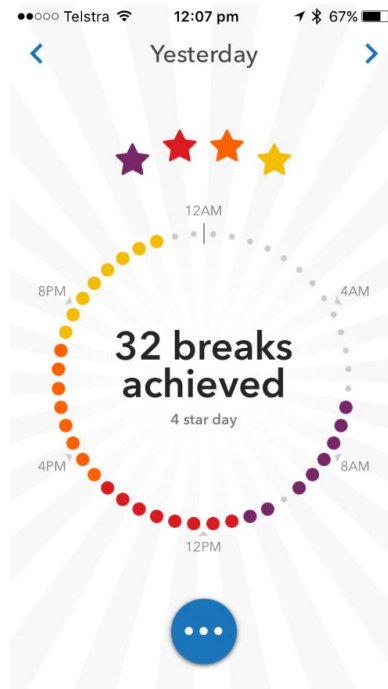
Benefits may be proportional to degree of metabolic impairment



Paddy Dempsey



Ashleigh Homer



Project Grant: 2018-2022

“Can reducing sitting AND increasing daily moving time influence sustained glycaemic control in middle-aged and older office workers with Type 2 Diabetes”

‘The OPTIMISE Your Health study’

CI's: David Dunstan, Neville Owen, Elizabeth Eakin, Stuart Biddle, Genevieve Healy, Robin Daly, Daniel Green, Marj Moodie, Elisabeth Winkler, Neale Cohen

Recruitment commencing: May 2019

<https://www.baker.edu.au/research/clinical-trials/optimize-study>

Take Home Messages

- Excessive sitting AND physical inactivity is highly prevalent across society
- There is now strong evidence linking excessive sitting to chronic disease risk
- Solutions need to be sought to overcome the ‘normal’ state of prolonged, uninterrupted patterns of sitting in various contexts – particularly workplace/schools
- **The Key Message:** In addition to engaging in health-enhancing exercise, people should be encouraged to minimise the time spent in prolonged sitting and break up long periods of sitting as often as possible

“Sit Less, Move More, More Often

Acknowledgements and Thanks

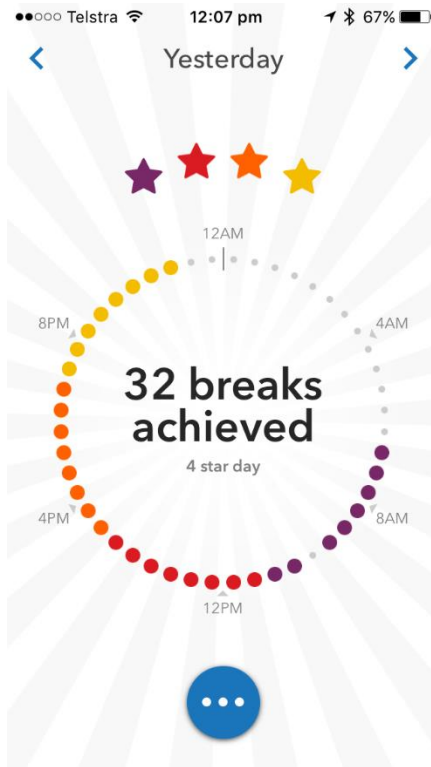
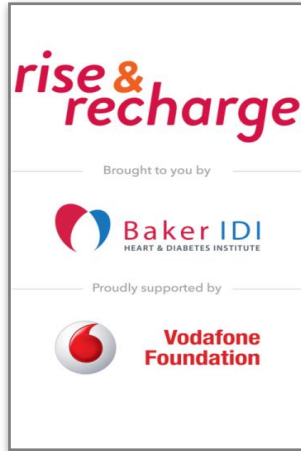
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Deakin University: Jo Salmon, Ester Cerin (now ACU), Marj Moodie, Robin Daly, Tony La Montagne

Thank You For Listening



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