diabetesdistilled
the latest developments filtered for you

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I have received funding from the following companies for providing educational sessions, writing documents, and for attending advisory boards and conferences:

Abbott, Boehringer Ingelheim, Astra Zeneca, Eli Lilly, Janssen, MSD, Napp and Novo Nordisk
OmniaMed, RCGP and Sherborne Gibbs

Lifestyle -
5S – 24 hour physical behaviours
Brief diet advice

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Thanks to Sarah Davies for letting me view her PCDS Wales Masterclass slides and to friends and colleagues who have inspired me to get better at motivating behaviour change

What behaviour would you like to change and what are the barriers?

Jot down what you ate and drank yesterday

Are you a good sleeper? Are you at risk of 'social jetlag?

Reflect on your answers as we discuss these topics

Management of Hyperglycemia in Type 2 Diabetes, 2022. A Consensus Report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD)

Melanie J. Davies,[1,2] Vanita R. Aroda,[3] Billy S. Collins,[4] Robert A. Gabbay,[5] Jennifer Green,[6] Nisa M. Maruthur,[7] Sylvia E. Rosas,[8] Stefano Del Prato,[9] Chantal Mathieu,[10] Geltrude Mingrone,[11,12,13] Peter Rossing,[14,15] Tsvetalina Tankova,[16] Apostolos Tsapas,[17,18] and John B. Buse[19]

https://doi.org/10.2337/dci22-0034

The 24 hour physical behaviours - 5Ss:

Sleep

Physical activity (PA):

- ✓ Sitting
- ✓ Stepping
- ✓ Sweating
- ✓ Strengthening

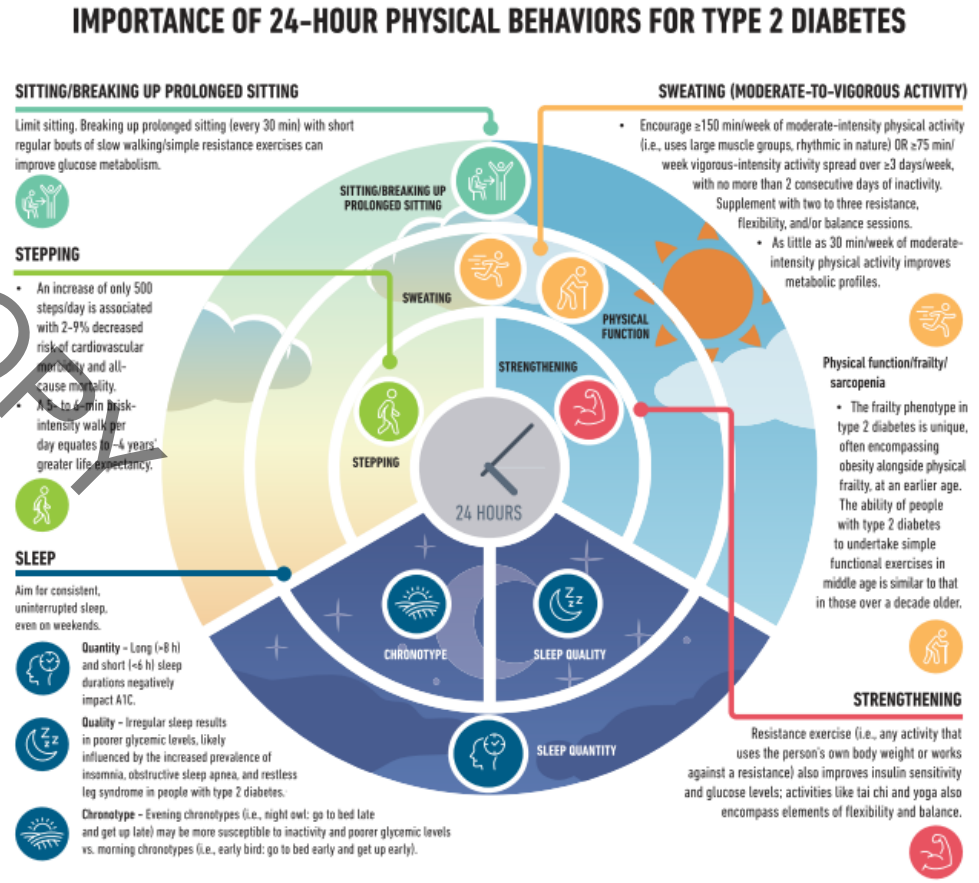
Effects of Physical Activity:

- ✓ ↑ uptake glucose to muscles
- ✓ Improved systemic +/- hepatic insulin sensitivity for 2-72 hours
- ✓ ↓ blood glucose
- ✓ Regular PA improves beta cell function, Insulin Sensitivity, vascular function, gut microbiota

	Glucose/insulin	Blood pressure	A1C	Lipids	Physical function	Depression	Quality of life
SITTING/BREAKING UP PROLONGED SITTING	↓	↓	↓	↓	↑	↓	↑
STEPPING	↓	↓	↓	↓	↑	↓	↑
SWEATING (MODERATE-TO-VIGOROUS ACTIVITY)	↓	↓	↓	↓	↑	↓	↑
STRENGTHENING	↓	↓	↓	↓	↑	↓	↑
ADEQUATE SLEEP DURATION	↓	↓	↓	↓	?	↓	↑
GOOD SLEEP QUALITY	↓	↓	↓	↓	?	↓	↑
CHRONOTYPE/CONSISTENT TIMING	↓	?	↓	?	?	↓	?

IMPACT OF PHYSICAL BEHAVIORS ON CARDIOMETABOLIC HEALTH IN PEOPLE WITH TYPE 2 DIABETES

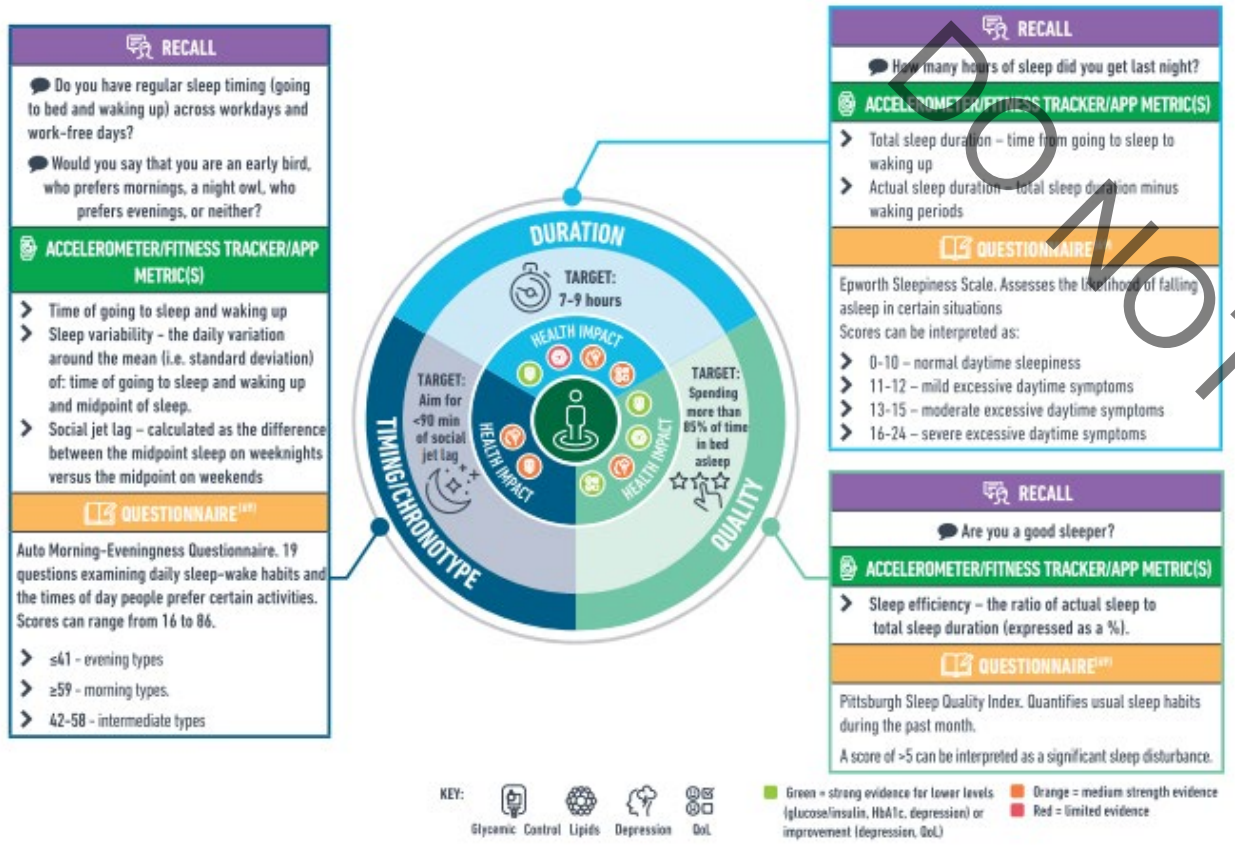
↑ Higher levels/improvement (physical function, quality of life); ↓ Lower levels/improvement (glucose/insulin, blood pressure, A1C, lipids, depression); ? no data available;
↑ Green arrows = strong evidence; ↑ Yellow arrows = medium-strength evidence; ↑ Red arrows = limited evidence.



Sleep and T2DM

Waking Up to the Importance of Sleep in Type 2 Diabetes Management: A Narrative Review *Diabetes Care 2024;47(3):331–343 | https://doi.org/10.2337/dci23-0037*

Joseph Henson, Alix Covenant, Andrew P. Hall, Louisa Herring, Alex V. Rowlands, Thomas Yates, and Melanie J. Davies



Asking simple questions can help us identify sleep problems in people with or at risk of T2DM so we can help them sleep better

Sleep – a state of reduced mental and physical activity to allow recharge

Key questions:

- ✓ Are you a good sleeper?

Insomnia

- ✓ Any difficulty getting to sleep or staying asleep?

Obstructive sleep apnoea

- ✓ Are you a heavy snorer? Does anyone tell you that you stop breathing?

Duration

- ✓ How many hours of sleep did you get last night? Is this normal for you?

Timing/chronotype

- ✓ Do you have regular sleep timing? Any difference workdays and non-work days? (Social jetlag aim for <90 minutes)
- ✓ Early bird/lark, night owl or neither?

Insomnia - 39% people with T2DM
Moderate to severe OSA – 24-70%

Sleep and T2DM prevention

JAMA Network Open

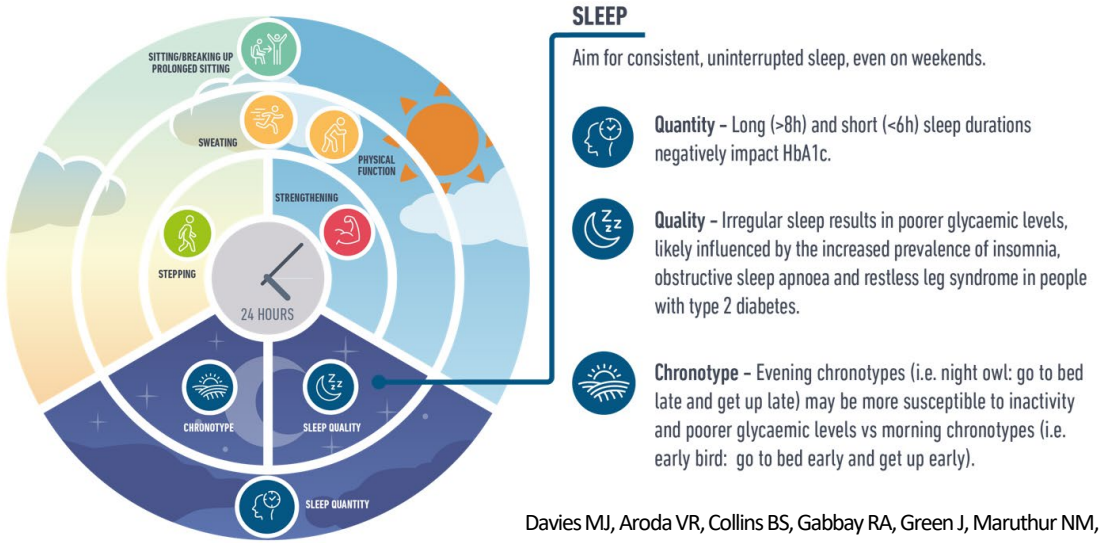
Original Investigation | Diabetes and Endocrinology

Habitual Short Sleep Duration, Diet, and Development of Type 2 Diabetes in Adults

Diana Aline Nôga, PhD; Elisa de Mello e Souza Meth, BSc; André Pekkola Pacheco, MD; Xiao Tan, PhD; Jonathan Cedernaes, MD, PhD; Lieve Thecla van Egmond, PhD; Pei Xue, MD, PhD; Christian Benedict, PhD

JAMA Network Open 2024; 7(3)

- ✓ UK Biobank cohort study n=250,000 follow up 12.5 yrs
- ✓ 3.2% developed T2DM
- ✓ Habitual <7 hours at baseline associated with ↑ risk T2DM; supported by Nurse Health Study 11
- ✓ You can't beat sleep deprivation risk with healthy eating



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Joseph Henson, Alix Covenant, Andrew P. Hall, Louisa Herring, Alex V. Rowlands, Thomas Yates, and Melanie J. Davies

- ✓ U-shaped association sleep quantity and risk of T2DM - 7 hours/night optimal
- ✓ Each hour > or < 7 hrs – 9-14% increased risk T2DM; long sleep evidence less clear than short
- ✓ 40-84% ↑ risk developing T2DM if poor sleep quality
- ✓ Night owls 2.5 times ↑ risk T2DM v larks
- ✓ Shift work – 10% ↑ risk T2DM; larks more impacted than night owls
- ✓ Sleep deprivation and circadian misalignment interact

Paramesaran and Ray Sleep, circadian rhythms and type 2 diabetes mellitus Clin endocrinol 2022; 96:12-20

Davies MJ, Aroda VR, Collins BS, Gabbay RA, Green J, Maruthur NM, Rosas SE, Del Prato S, Mathieu C, Mingrone G, Rossing P, Tankova T, Tsapas A, Buse JB

Diabetes Care 2022; https://doi.org/10.2337/dci22-0034. *Diabetologia* 2022; https://doi.org/10.1007/s00125-022-05787-2.

Sleep and type 2 diabetes

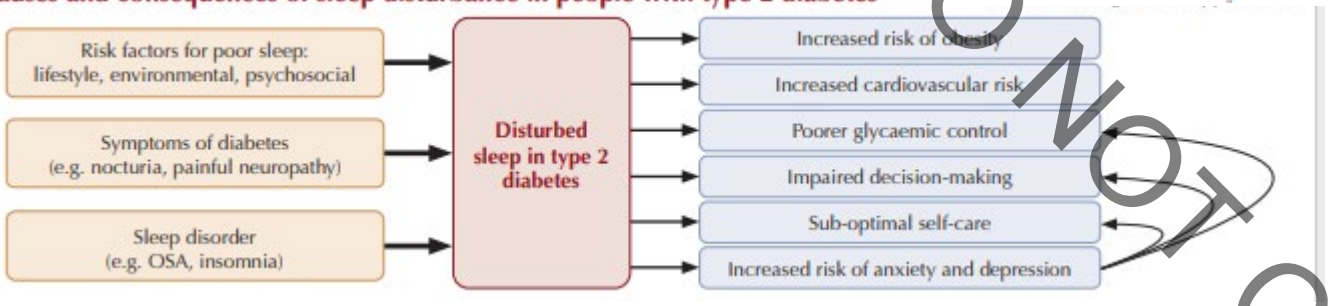
Lifestyle discussions:
Sleep and type 2 diabetes

At a glance factsheet

Citation: Steven S, Rutter MK (2022) Sleep and type 2 diabetes. *Diabetes & Primary Care* **24**: 193–5

Schipper SBJ et al (2021) Sleep disorders in people with type 2 diabetes and associated health outcomes: a review of the literature. *Diabetologia* **64**: 2367–77

Causes and consequences of sleep disturbance in people with type 2 diabetes



Waking Up to the Importance of Sleep in Type 2 Diabetes Management: A Narrative Review

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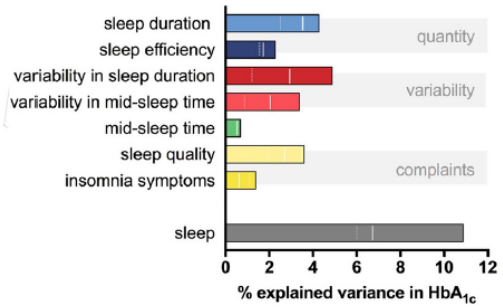
- ✓ U shaped association between sleep duration and HbA1c
  - ✓ > 8 hours or < 6 hours detrimental
- ✓ ≤ 5 hours v 7 hours/night – 40-70% ↑ risk ischaemic stroke and CVD mortality
- ✓ ≤4 hours v 7 hours/night 41% ↑ risk all cause mortality, 54% ↑ CVD mortality

Potential mechanisms linking sleep and T2DM

- ✓ ↑ cortisol ↓ insulin sensitivity
- ✓ Short sleep ↑ ghrelin, ↓ leptin
  - ↑ hunger and appetite

Sleep and HbA_{1c} in Patients With Type 2 Diabetes: Which Sleep Characteristics Matter Most?

Diabetes Care 2020;43:235–243 | https://doi.org/10.2337/dc19-0550



Do we ask about sleep?
Do we know who works shifts?
How well do we identify sleep disorders?

Obstructive sleep apnoea/hypopnoea syndrome diagnosis

STOP-Bang Questionnaire

Is it possible that you have ...
Obstructive Sleep Apnea (OSA)?

Please answer the following questions below to determine if you might be at risk.

Yes ○	No ○	**S**noring ? Do you **Snore Loudly** (loud enough to be heard through closed doors or your bed-partner elbows you for snoring at night)?
Yes ○	No ○	**T**ired ? Do you often feel **Tired, Fatigued, or Sleepy** during the daytime (such as falling asleep during driving or talking to someone)?
Yes ○	No ○	**O**bserved ? Has anyone **Observed** you **Stop Breathing** or **Choking/Gasping** during your sleep ?
Yes ○	No ○	**P**ressure ? Do you have or are being treated for **High Blood Pressure** ?
Yes ○	No ○	**B**ody Mass Index more than 35 kg/m^2?
Yes ○	No ○	**A**ge older than 50 ?
Yes ○	No ○	**N**eck size large ? (Measured around Adams apple) Is your shirt collar 16 inches / 40cm or larger?
Yes ○	No ○	**G**ender = Male ?

See Result

For general population
OSA - Low Risk : Yes to 0 - 2 questions
OSA - Intermediate Risk : Yes to 3 - 4 questions
OSA - High Risk : Yes to 5 - 8 questions
or Yes to 2 or more of 4 STOP questions + male gender
or Yes to 2 or more of 4 STOP questions + BMI > 35kg/m^2
or Yes to 2 or more of 4 STOP questions + neck circumference 16 inches / 40cm

Screening if witnessed apnoea, daytime tiredness, resistant hypertension

Epworth Sleepiness Score

In contrast to just feeling tired, how likely are you to doze off or fall asleep in the following situations? Even if you have not done some of these things recently, try to work out how they would affect you. **Use the following scale to choose the most appropriate number for each situation.**

Situation (Please tick box)	0 No chance of dozing	1 Slight chance	2 Moderate chance	3 Definitely would doze
Sitting and reading	☐	☐	☐	☐
Watching TV	☐	☐	☐	☐
Sitting inactive in a public place (e.g. Theatre or a meeting)	☐	☐	☐	☐
As a passenger in a car for an hour without a break	☐	☐	☐	☐
Lying down to rest in the afternoon when circumstances permit	☐	☐	☐	☐
Sitting and talking to someone	☐	☐	☐	☐
Sitting quietly after lunch without alcohol	☐	☐	☐	☐
In a car, while stopped for a few minutes in traffic	☐	☐	☐	☐

0–10	Normal range in healthy adults
11–14	Mild sleepiness
15–17	Moderate sleepiness
18 or higher	Severe sleepiness

Obstructive sleep apnoea/hypopnoea syndrome

Obstructive sleep apnoea – overlooked comorbidity in patients with diabetes

Tenda et al World J Diabetes 2024 15: 1448-1460

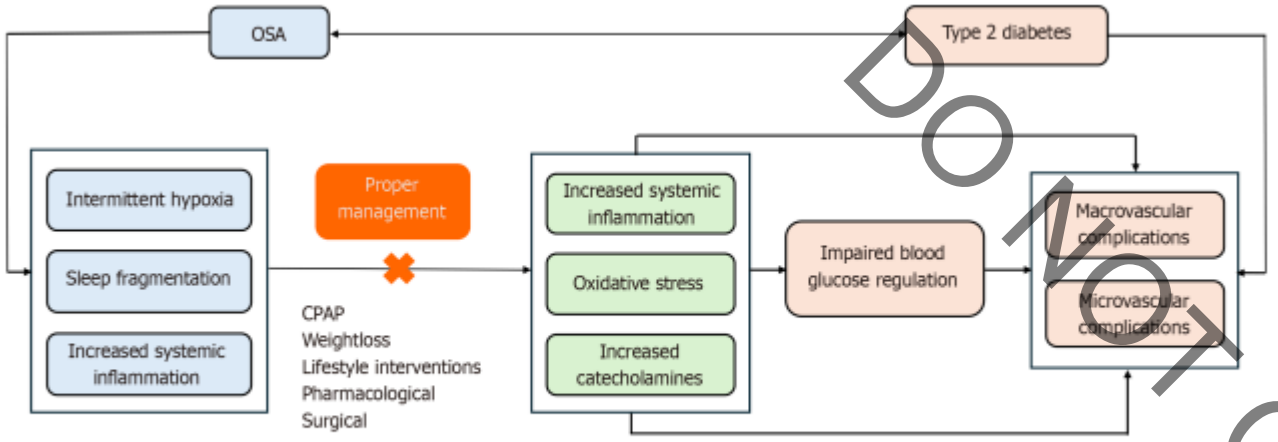


Figure 1 The relationship between obstructive sleep apnea and type 2 diabetes mellitus. OSA: Obstructive sleep apnea; CPAP: Continuous positive airway pressure.

- ✓ Increased risk of T2DM
- ✓ Complex 2-way relationship OSA/T2DM
- ✓ Increases insulin resistance, microvascular and macrovascular complications
- ✓ Screen if daytime sleepiness or resistant hypertension; refer

Management:

- ✓ Weight loss – behavioural change programmes, GLP-1RAs, bariatric surgery
- ✓ Positive airways pressure – data inconsistent on effects on glucose/diabetes control; can improve sleep quality; small wt gain usual
- ✓ Remind to report to DVLA

https://deepbreathin.podbean.com/e/obstructive-sleep-apnoea-with-sophie-west-and-robert-koefman/

Obstructive sleep apnoea/ hypopnoea syndrome and obesity hypoventilation syndrome in over 16s

NICE guideline
Published: 20 August 2021

Tirzepatide for the Treatment of Obstructive Sleep Apnea and Obesity

Malhotra et al N Engl J Med 2024; 391: 1193-1205

Sleep Prescription

- ✓ Ask:
  - ✓ Are you a good sleeper?
  - ✓ Any difficulty getting to sleep or staying asleep? (insomnia)
  - ✓ How many hours of sleep did you get last night? Is this normal for you?
  - ✓ Do you have regular sleep timing? Any difference workdays and non-work days? (social jetlag)
  - ✓ Are you a night owl or lark or neither?
  - ✓ Are you a heavy snorer? Does anyone tell you that you stop breathing? (OSAH)

- ✓ 7 hours optimal – sleep hygiene/other management to help people achieve this
- ✓ Discuss and discourage social jet lag
- ✓ At risk of T2DM – weight loss, manage sleep to reduce risk
- ✓ T2DM – help optimise sleep to improve control and reduce complications
- ✓ Identify and manage OSAH
  - ✓ STOP BANG or Epworth sleepiness scale
  - ✓ CPAP improves QoL and driving safety but may not improve weight or glycaemia
- ✓ Identify shift workers – at risk of T2DM and difficult to control glycaemia

Physical (in)activity – sitting

- ✓ Break up sitting every 30 minutes – short bouts of walking or resistance exercise
- ✓ Set a timer to remind – may also improve productivity

SITTING/BREAKING UP PROLONGED SITTING

Limit sitting. Breaking up prolonged sitting (every 30 min) with short regular bouts of slow walking/simple resistance exercises can improve glucose metabolism.

Davies MJ, Aroda VR, Collins BS, Gabbay RA, Green J, Maruthur NM, Rosas SE, Del Prato S, Mathieu C, Mingrone G, Rossing P, Tankova T, Tsapas A, Buse JB

Diabetes Care 2022; https://doi.org/10.2337/dci22-0034. *Diabetologia* 2022; https://doi.org/10.1007/s00125-022-05787-2.

Diabetes Prevention

AJPM American Journal of Preventive Medicine

Sitting Time and Risk of Cardiovascular Disease and Diabetes: A Systematic Review and Meta-Analysis

Daniel P. Bailey, PhD [1] · David J. Hewson, PhD [2] · Rachael B. Champion, BSc [1] · Suzan M. Sayegh, MPH [3]

- ✓ 9 studies, almost 450,000 participants
- ✓ Prolonged sitting
  - ✓ CVD significantly ↑ risk; HR 1.27; HR ↓to 1.11 when adjusted for exercise
  - ✓ Diabetes significantly ↑ risk HR=1.13; minimal change when adjusted for exercise

Original Investigation | Public Health

Occupational Sitting Time, Leisure Physical Activity, and All-Cause and Cardiovascular Disease Mortality

Wayne Gao, PhD; Mattia Sanna, PhD; Yea-Hung Chen, PhD; Min-Kuang Tsai, PhD; Chi-Pang Wen, MD, PhD

JAMA Network Open. 2024;7(1):e2350680. doi:10.1001/jamanetworkopen.2023.50680

- ✓ 16% ↑mortality, 34% ↑ CVD risk if sitting occupation – cohort 12.85 years follow up
- ✓ Not diabetes specific
- ✓ ↓ risk with breaking up sitting or 15-30 minute extra physical activity

Physical (in)activity – sitting

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

Diabetes Care 2016;39:964–972 | DOI: 10.2337/dc15-2336

- ✓ Randomised crossover n=24 overweight/obese, T2DM
- ✓ Uninterrupted sitting, every 30 mins - 3 mins light walking, or 3 mins simple resistance activities
- ✓ Resistance – 9 x 20 sec half squats, heel raises, gluteal contractions, knee raises – set tempo
- ✓ Either activity improves post-prandial glucose (↓39%) and insulin (↓ 36-37%)

- ✓ Modern society – less opportunity non-exercise PA
- ✓ T2DM prevention – 2 mins activity every 20 mins ↓ risk
- ✓ T2DM 45 mins moderate exercise or 3x15 min bouts light activity over a sitting day ↓ post prandial glucose/insulin

Van Dijk et al 2013 Diabetes care

COLUMBIA | MAILMAN SCHOOL OF PUBLIC HEALTH

Sitting Time and Its Interaction With Physical Activity in Relation to All-Cause and Heart Disease Mortality in U.S. Adults With Diabetes

N=6335 with diabetes, median follow up 5.9 years

- ✓ Longer sitting time associated with ↑ all cause and CVD mortality ONLY in those with <150 mins/week MVPA

Conclusion: In adults with diabetes, meeting guideline-recommended physical activity may offset the elevated all-cause and heart disease mortality risk associated with excessive sitting time.

Dai and Albrecht *Diabetes Care* 2024; 47 (10): 1764–1768

Either meet guideline weekly PA or break up sitting to reduce risk

Physical activity – stepping

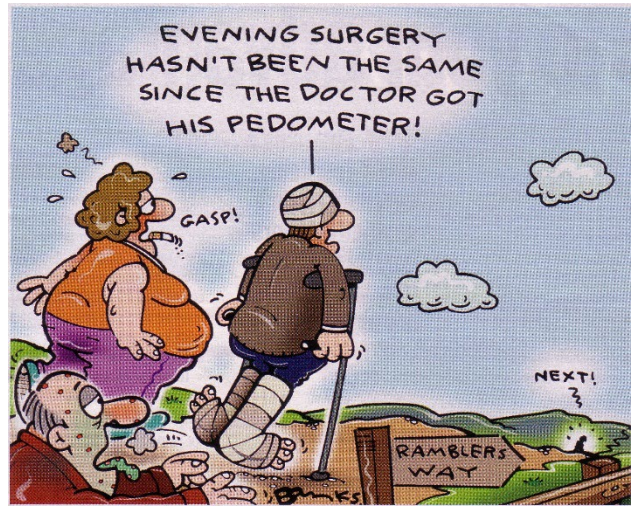
Physical activity – all movement that ↑ energy use
Exercise – Activity structured and designed to improve physical fitness

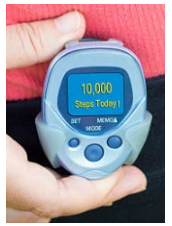
Manpo-kei is literally written 万歩計

Dr Yoshino Hatano, Kyushu, – increasing obesity in Japan; increase from 3-5k steps /day to 10k steps - 10,000 steps meter

STEPPING

- An increase of only 500 steps/day is associated with 2–9% decreased risk of cardiovascular morbidity and all-cause mortality.
- A 5 to 6 min brisk intensity walk per day equates to ~4 years' greater life expectancy.





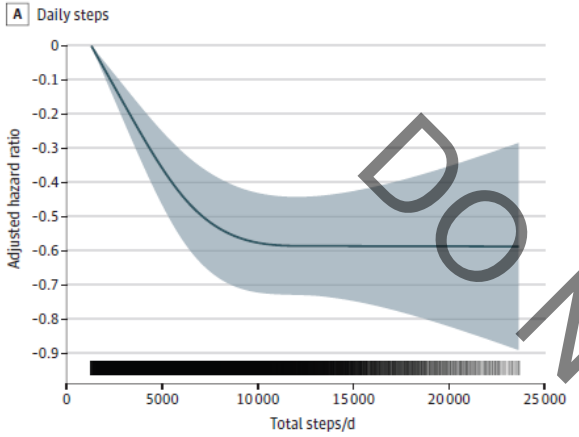
Davies MJ, Aroda VR, Collins BS, Gabbay RA, Green J, Maruthur NM, Rosas SE, Del Prato S, Mathieu C, Mingrone G, Rossing P, Tankova T, Tsapas A, Buse JB

Diabetes Care 2022; https://doi.org/10.2337/dci22-0034. *Diabetologia* 2022; https://doi.org/10.1007/s00125-022-05787-2.

Physical activity – stepping

- ✓ UK Biobank large prospective cohort study
- ✓ Median follow up 7 years, 97% White

Figure 1. Dose-Response Associations Between Primary Exposures and All-Cause Mortality



- ✓ Association of steps and
  - ✓ all cause, CV and cancer mortality
  - ✓ incidence of cancer and CVD
- ✓ Clear dose response relationship to 10,000 steps; >10k steps decreased CVD and cancer incidence
- ✓ No lower limit to steps to gain some benefit

Safety

- ✓ Start low and go slow as build up
- ✓ Measure glucose if SU or insulin – hypo risk
- ✓ Foot ulcers – avoid weight-bearing; neuropathy seek guidance, foot inspection
- ✓ Retinopathy – seek guidance
- ✓ CVD – cardiac rehab recent events; seek guidance anything more than walking

Diabetes Distilled: I would walk 10 000 steps but should I walk 10 000 more?

Increasing daily step count reduces mortality and morbidity up to around 10 000… steps, with no minimum step

10 May 2023

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Some activity/stepping better than none

How do you measure your steps and does this motivate you to walk more?

Physical activity – stepping

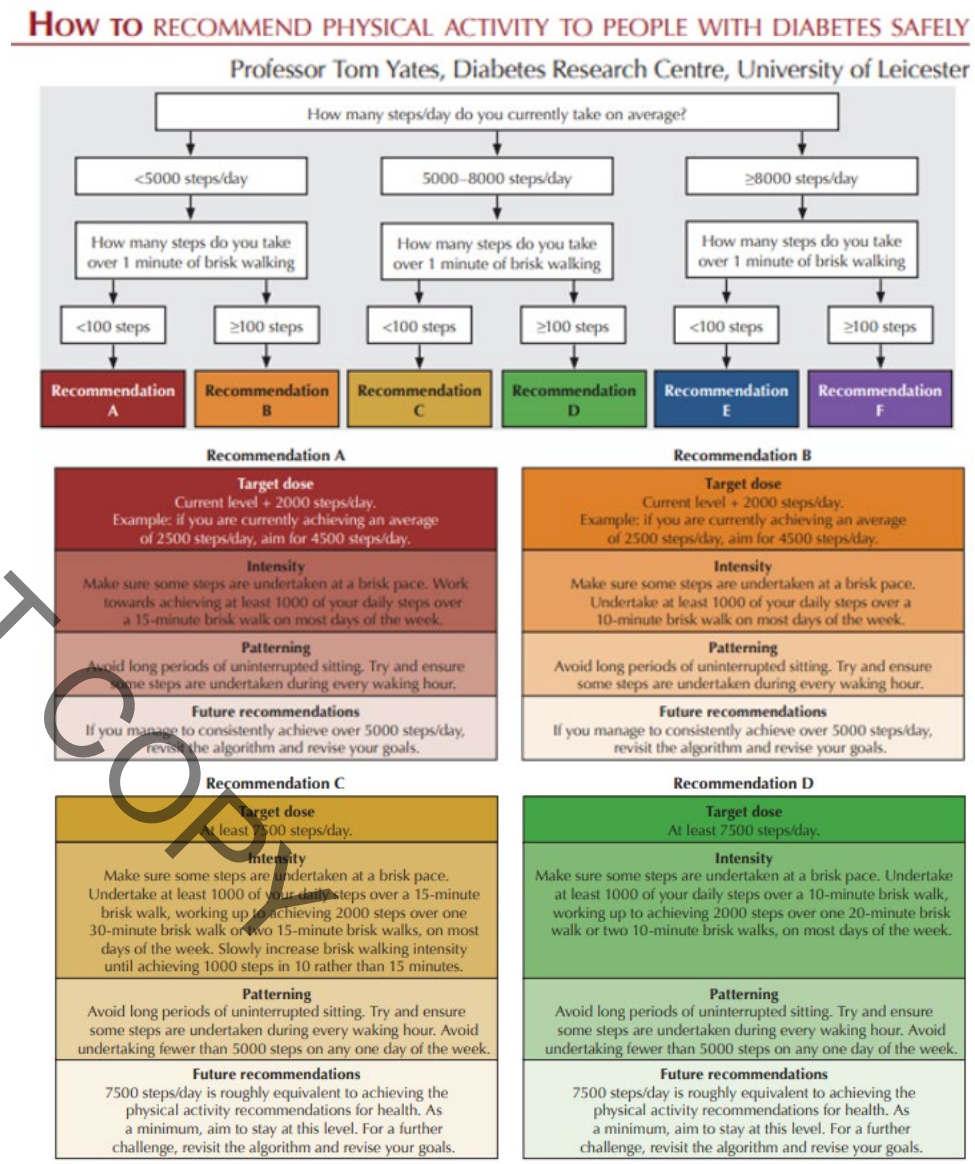
Annals of Internal Medicine

Consult Guys

How Many Steps Are Associated With Better Health?

- ✓ Stride 42% of height – frail, shorter strides
- ✓ Steps and mortality – plateau at 6k-8k ≥60 yrs, 8k-10k steps <60 yrs[1]
- ✓ Mainly sedentary – 10 yr follow up - replace 1 hour with light activity 18% ↓mortality; replace with MVPA 42% ↓mortality[2]
- ✓ Mortality rate per 1000 person-years[3]
  - <4000 steps/day: 76.7
  - 4000 to 7999 steps/day: 21.4
  - 8000 to 11,999 steps/day: 6.9
  - ≥12,000 steps/day: 4.8
- ✓ 2600 to 2800 steps/day associated with ↓ mortality and CVD events v 2000 steps/day[4]
- ✓ Women's health study 4.3 yrs follow up
  - ✓ No steps >50% time; incidental steps 45.5%; purposeful steps 3.1%
  - ✓ 4,400 steps/day 41% ↓mortality v 2700
  - ✓ Progressive ↓mortality benefit to 7500

1. Paluch AE et al. Lancet Public Health. 2022;7:e219-e228
2. Matthews CE et al. Am J Clin Nutr. 2016;104:1424-1432
3. Saint-Maurice PF et al. JAMA. 2020;323:1151-1160
4. Stens NA et al. J Am Coll Cardiol. 2023;82:1483-1494
5. Lee IM et al. JAMA Intern Med. 2019;179:1105-1112



Citation: Yates T (2019) How to recommend physical activity to people with diabetes safely. *Diabetes & Primary Care* **21**: 113–14

Physical activity – Sweating

Exercise/Physical Activity in Individuals with Type 2 Diabetes: A Consensus Statement from the American College of Sports Medicine *Med Sci Sports Exerc.* 2022 February 01; 54(2): 353–368. Kanaley et al

SWEATING (MODERATE-TO-VIGOROUS ACTIVITY)

- Encourage ≥150 min/week of moderate-intensity physical activity (i.e. uses large muscle groups, rhythmic in nature) OR ≥75 min/week vigorous-intensity activity spread over ≥3 days/week, with no more than 2 consecutive days of inactivity. Supplement with two to three resistance, flexibility and/or balance sessions.
- As little as 30 min/week of moderate-intensity physical activity improves metabolic profiles.

Physical function/frailty/sarcopenia

- The frailty phenotype in type 2 diabetes is unique, often encompassing obesity alongside physical frailty, at an earlier age. The ability of people with type 2 diabetes to undertake simple functional exercises in middle-age is similar to that in those over a decade older.

Leisure-time physical activity and all-cause mortality and cardiovascular disease in adults with type 2 diabetes: Cross-country comparison of cohort studies

Tarp et al Journal of Sport and Health Science 13 (2024) 212–221

- ✓ Possible association recommended PA with lower all cause/CVD mortality but inconsistent
- ✓ Recommended PA levels not associated with ↓mortality or MACE incidence

Davies MJ, Aroda VR, Collins BS, Gabbay RA, Green J, Maruthur NM, Rosas SE, Del Prato S, Mathieu C, Mingrone G, Rossing P, Tankova T, Tsapas A, Buse JB

Diabetes Care 2022; https://doi.org/10.2337/dci22-0034. *Diabetologia* 2022; https://doi.org/10.1007/s00125-022-05787-2.

Physical activity to optimise glucose control

Optimal Dose and Type of Physical Activity to Improve Glycemic Control in People Diagnosed With Type 2 Diabetes: A Systematic Review and Meta-analysis Gallardo-Gomez et al *Diabetes Care 2024;47(2):295–303*

Personalizing Physical Activity for Glucose Control Among Individuals With Type 2 Diabetes: Are We There Yet? Zhang and Yang

Diabetes Care 2024;47:196–198 | https://doi.org/10.2337/dci23-0063

- ✓ Metabolic Equivalents of Task (MET)-minutes/week – measure of oxygen uptake for given task – resting = 1 MET
- ✓ 1100 MET minutes/week to optimise glucose at all baseline HbA1c levels
- ✓ Achieving these recommendations can ↓ HbA1c
  - ✓ > 11mmol/mol if baseline >64mmol/mol
  - ✓ 2.64-4.18 mmol/mol in those with prediabetes
- ✓ 36 mins/day moderate walking, 244 mins/week moderate intensity aerobic activity, 318 minute moderate strength training/week

Table 1. Physical activity types and amounts required for optimal glycaemic benefits (Zhang and Yang, 2024).

Activity	Weekly amount
Moderate-intensity aerobic physical activity	244 min/week
Vigorous-intensity aerobic physical activity	157 min/week
Moderate-intensity multicomponent activity (aerobic and strength combined)	314 min/week
Vigorous-intensity multicomponent activity	138 min/week
Moderate-intensity strength training	314 min/week
Vigorous-intensity strength training	183 min/week
Moderate-paced brisk walking	256 min/week
Vigorous-paced brisk walking	157 min/week

Table 2. Examples of physical activities and their associated metabolic equivalents of task (METs).

Activity	METs/minute	Category
Resting	1.0	Reference
Sitting at desk, writing	1.5	Light
Slow walking	2.0	Light
Walking 3 mph	3.0	Moderate
Sweeping floors and hoovering carpets	3.0–3.5	Moderate
Cycling on flat	6.0	Vigorous
Swimming moderate to hard	8.0–11.0	Vigorous
Jogging (9 km/h, 11 km/h)	8.8, 11.2	Vigorous

Data taken from the Compendium of Physical Activities website.

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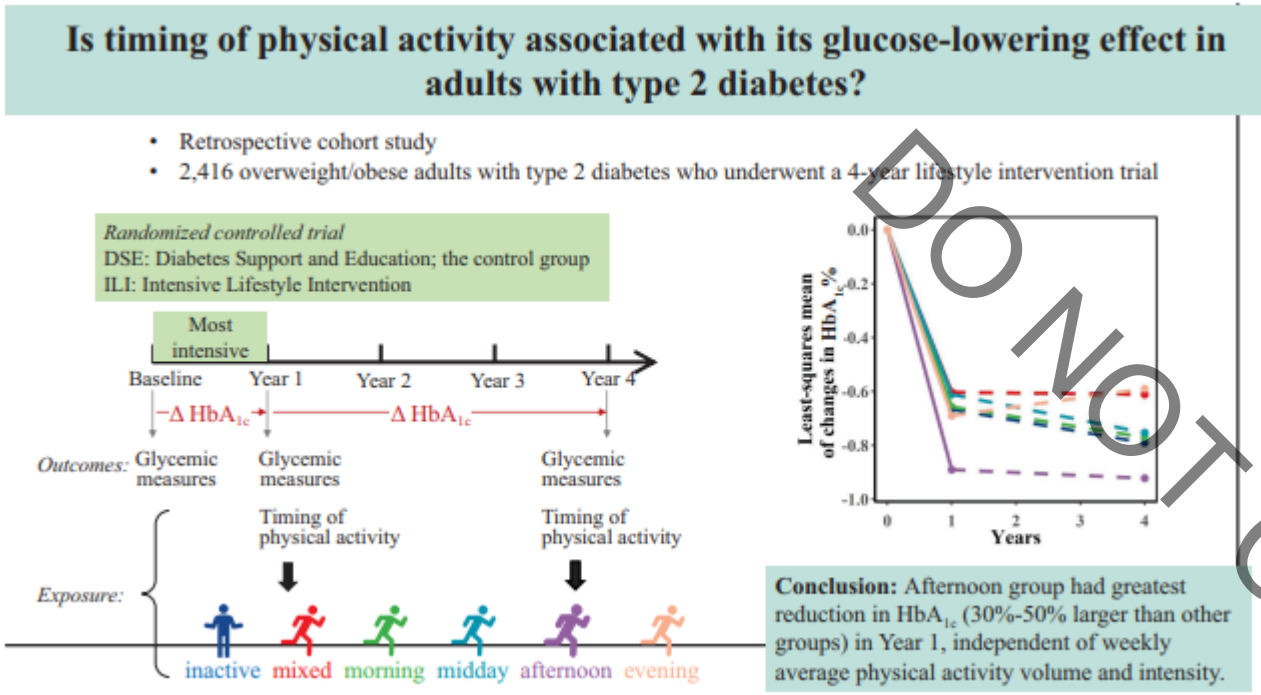
Physical activity – how much is needed to optimise glycaemic control?

Citation: Brown P (2024) Diabetes Distilled: Physical activity – how much is needed to optimise glycaemic control? *Diabetes & Primary Care* **26**: 29–31

Physical activity - timing



- ✓ Waist worn accelerometers
- ✓ 30-50% greater reductions in HbA1c at yr 1 in afternoon exercisers in ILI group - independent of weekly activity
- ✓ No significant changes in HbA1c in any group yr 1 to yr 4

Xian et al Diabetes Care 2023; 46: 1417-1424

Exercise/Physical Activity in Individuals with Type 2 Diabetes: A Consensus Statement from the American College of Sports Medicine *Med Sci Sports Exerc.* 2022 February 01; 54(2): 353–368.

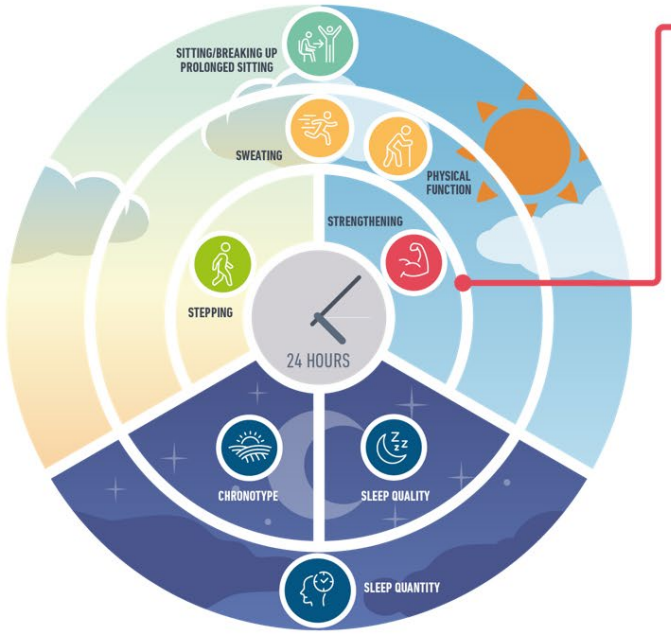
- ✓ Improved glycaemia with exercise after breakfast
- ✓ Walking post meal can reduce glucose – optimal ≥45 minutes duration
- ✓ Post dinner resistance exercise decreases glucose and triglyceride levels

- ✓ Metformin may decrease exercise benefits
- ✓ On betablockers, use Ratings of Perceived Exertion rather than HR to assess intensity

- ✓ Activity ‘snacks’ - 10 minute bouts of aerobic/resistance activity - may fit into lifestyle well

Physical activity – Strengthening

- ✓ Increasing understanding of early development of sarcopenia and frailty in people with diabetes
- ✓ Modern drugs for T2DM and obesity increase weight loss – fat and lean/muscle mass
- ✓ Diabetes prevention and remission focus on weight loss
- ✓ Combining resistance and aerobic exercise can help preserve muscle mass



STRENGTHENING

Resistance exercise (i.e. any activity that uses the person's own body weight or works against a resistance) also improves insulin sensitivity and glucose levels; activities like tai chi and yoga also encompass elements of flexibility and balance.

Flexibility – improve range of movement but not glycaemia

Balance – improves risk of falls even in those with neuropathy

Exercise/Physical Activity in Individuals with Type 2 Diabetes: A Consensus Statement from the American College of Sports Medicine *Med Sci Sports Exerc.* 2022 February 01; 54(2): 353–368.

Resistance exercise older adults - 10-15%

- ✓ ↑ strength
- ✓ ↑ bone density
- ✓ improvement in BP
- ✓ lipid profiles
- ✓ skeletal muscle mass
- ✓ insulin sensitivity

✓ High intensity more beneficial than low to moderate intensity for glycaemia

Liu Y et al. Int J Environ Res Public Health. 2019;16(1):140.

✓Combined aerobic/resistance training may be better than either alone

✓Combined results in ↑ volume and weight loss so this likely contributes

Sigal RJ et al. Ann Intern Med. 2007;147(6):357–69.

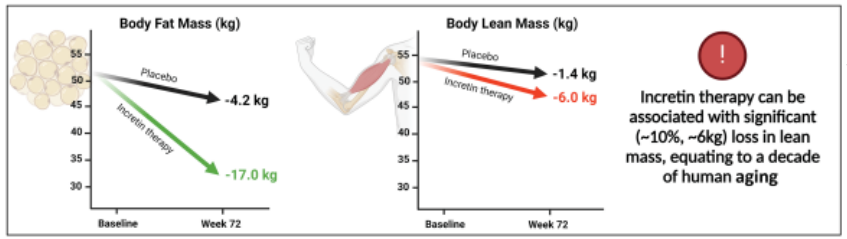
Davies MJ, Aroda VR, Collins BS, Gabbay RA, Green J, Maruthur NM, Rosas SE, Del Prato S, Mathieu C, Mingrone G, Rossing P, Tankova T, Tsapas A, Buse JB

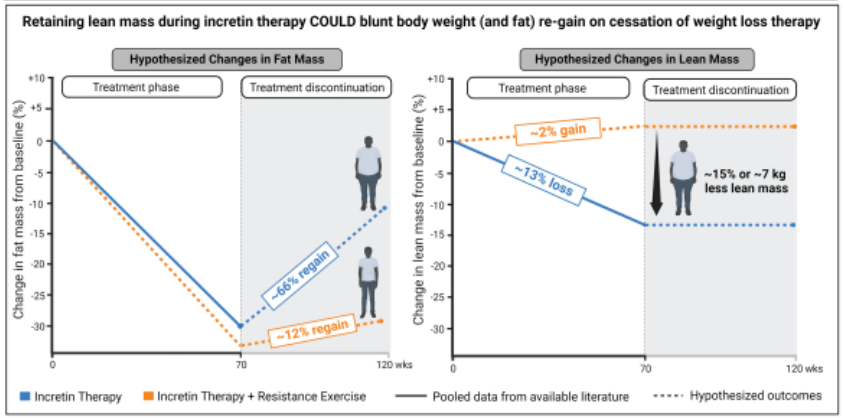
Diabetes Care 2022; https://doi.org/10.2337/dci22-0034. *Diabetologia* 2022; https://doi.org/10.1007/s00125-022-05787-2.

Lifestyle advice in the era of weight loss drugs - still needed?

Incretin-Based Weight Loss Pharmacotherapy: Can Resistance Exercise Optimize Changes in Body Composition?

Diabetes Care 2024;47(10):1718–1730 | https://doi.org/10.2337/dci23-0100





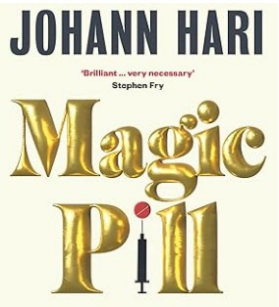
- ✓ Resistance more effective than aerobic exercise
- ✓ Preserving lean mass may reduce weight regain on therapy cessation
- ✓ Multiple health benefits – tailored resistance training when starting injectable weight loss Rx

Opportunities to optimize lifestyle interventions in combination with glucagon-like peptide-1-based therapy

Satya Dash MBBS

Diabetes Obes Metab. 2024;26(Suppl. 4):3–15.

- ✓ GLP-1RA Rx - ↓ lean body mass but improved lean to fat mass and function
- ✓ If sarcopenia concern - ↑ protein intake (up to 1.3g/kg body wt/day if no CKD); milk/whey > soya
- ✓ Resistance exercise may help
- ✓ Non-responders (<5% weight loss):
  - ✓ Wegovy 2.4mg- 14% no T2DM; 31% T2DM
  - ✓ Mounjaro 15mg - 9% no T2DM; 17% T2DM
- ✓ Consider nutritional deficiencies as with bariatric surgery

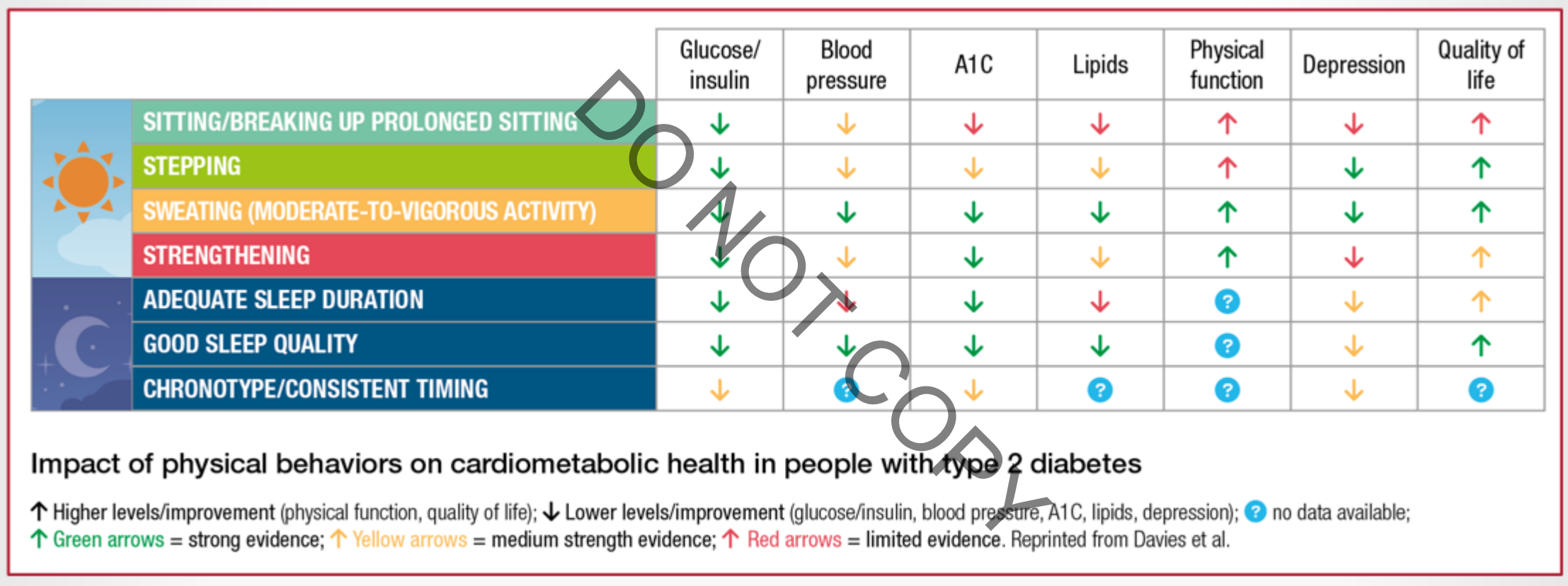


Physical Activity Prescription

- ✓ Individualise depending on baseline – any increase in activity is good
- ✓ Break up prolonged sitting time with 3 minutes walking or resistance exercise every 30 minutes
- ✓ Measure step count/speed then undertake programme to increase it
  - ✓ Add 500 steps/day; aim for minimum 5-6 minutes walking daily and build up
  - ✓ Professor Yates' walking programme
  - ✓ Mortality reduction - aim for 8-10,000 steps/day under 60 years, 6-8,000 steps/day ≥60 years
- ✓ Aerobic exercise 3 x weekly not more than 2 consecutive days inactive
- ✓ Build up to 1100 MET-minutes per week to optimise glucose – share activity choices
- ✓ Reduce sarcopenia and frailty with high intensity resistance exercise – 2-3 sessions weekly
- ✓ Flexibility/stretching to maintain joint range of movement and balance to reduce falls risk
- ✓ Resistance exercise to maintain lean mass in those on incretins for weight loss

- ✓ Alternative options for cardiometabolic benefit for those fit enough:
  - ✓ 5 minutes + stair climbing 350 steps, 70/min
  - ✓ 13 : 1 minutes/day ratio walking to stair-climbing
  - ✓ 7-15 : 1 ratio walking to high intensity/vigorous activity

Evidence supporting the 5S behaviour changes



	Glucose/ insulin	Blood pressure	A1C	Lipids	Physical function	Depression	Quality of life
SITTING/BREAKING UP PROLONGED SITTING	↓	↓	↓	↓	↑	↓	↑
STEPPING	↓	↓	↓	↓	↑	↓	↑
SWEATING (MODERATE-TO-VIGOROUS ACTIVITY)	↓	↓	↓	↓	↑	↓	↑
STRENGTHENING	↓	↓	↓	↓	↑	↓	↑
ADEQUATE SLEEP DURATION	↓	↓	↓	↓	?	↓	↑
GOOD SLEEP QUALITY	↓	↓	↓	↓	?	↓	↑
CHRONOTYPE/CONSISTENT TIMING	↓	?	↓	?	?	↓	?

Impact of physical behaviors on cardiometabolic health in people with type 2 diabetes

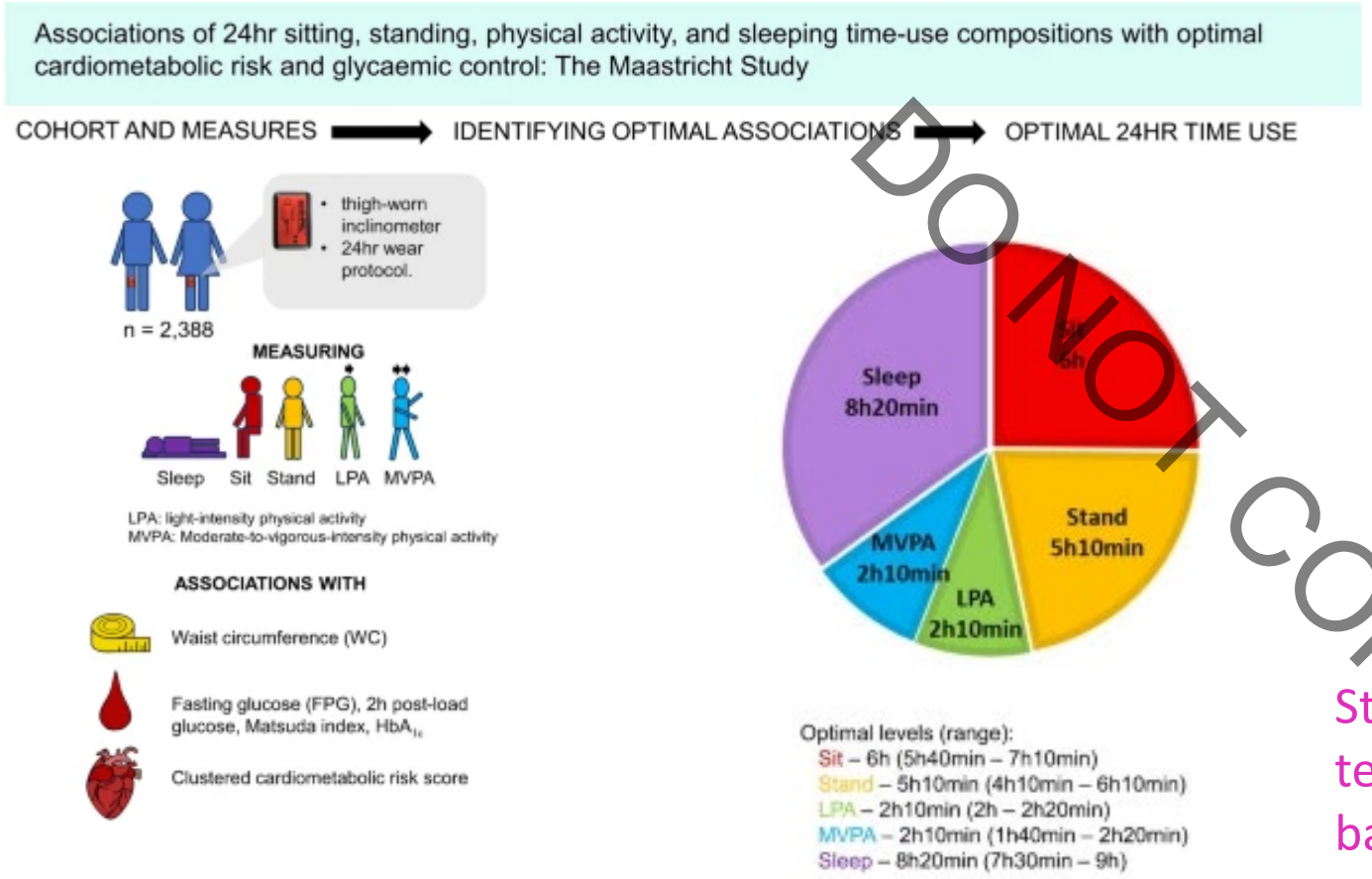
↑ Higher levels/improvement (physical function, quality of life); ↓ Lower levels/improvement (glucose/insulin, blood pressure, A1C, lipids, depression); ? no data available;
↑ Green arrows = strong evidence; ↑ Yellow arrows = medium strength evidence; ↑ Red arrows = limited evidence. Reprinted from Davies et al.

American Diabetes Association Primary Care Advisory Group. 5. Facilitating positive health behaviors and well-being to improve health outcomes: *Standards of Care in Diabetes—2024* abridged for primary care professionals. Clin Diabetes 2024;42:193–195 (doi: 10.2337/cd24-a005)

American Diabetes Association.

What is the perfect activity mix for cardiometabolic risk?

The Maastricht Study



No surprises but clarifies goals to share:

- ✓ Sleep 7.5 - 9 hrs
- ✓ Sit 6 -7hrs
- ✓ Stand 4 - 6 hrs
- ✓ Light activity 2-2.5hrs
- ✓ Moderate to vigorous activity 1.5-2.5hrs

- ✓ Even small changes will help

Start discussions. Many people have wearable technology – let's help them use it to gather baseline data and make changes to optimise cardiometabolic risk

Brakenridge, C.J., Koster, A., de Galan, B.E. *et al.* Associations of 24 h time-use compositions of sitting, standing, physical activity and sleeping with optimal cardiometabolic risk and glycaemic control: The Maastricht Study. *Diabetologia* (2024).
Open access.

'Never stand up when you can sit down and never sit down when you can lie down' Winston Churchill 1946

Brief diet advice in T2DM

Nutrition guidelines for diabetes

Remember food insecurity and cultural norms

Diabetologia (2023) 66:965–985
https://doi.org/10.1007/s00125-023-05894-8

GUIDELINES

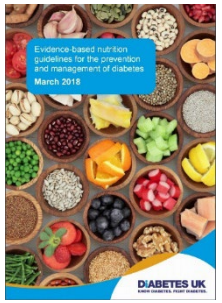
Evidence-based European recommendations for the dietary management of diabetes

Data do not support a specific distribution of macronutrients. People with diabetes may choose from a variety of healthy eating patterns to fit their needs and preferences.

'Low and very low CHO diets are a viable option for selected adults with T2DM:
who are not meeting targets or want to decrease treatment'

....consume at least 14g fiber per 1,000 kcal with at least half of grain .....being whole intact grains

Mediterranean eating pattern – improves glycaemia, weight, CV risk factors in people with T2DM



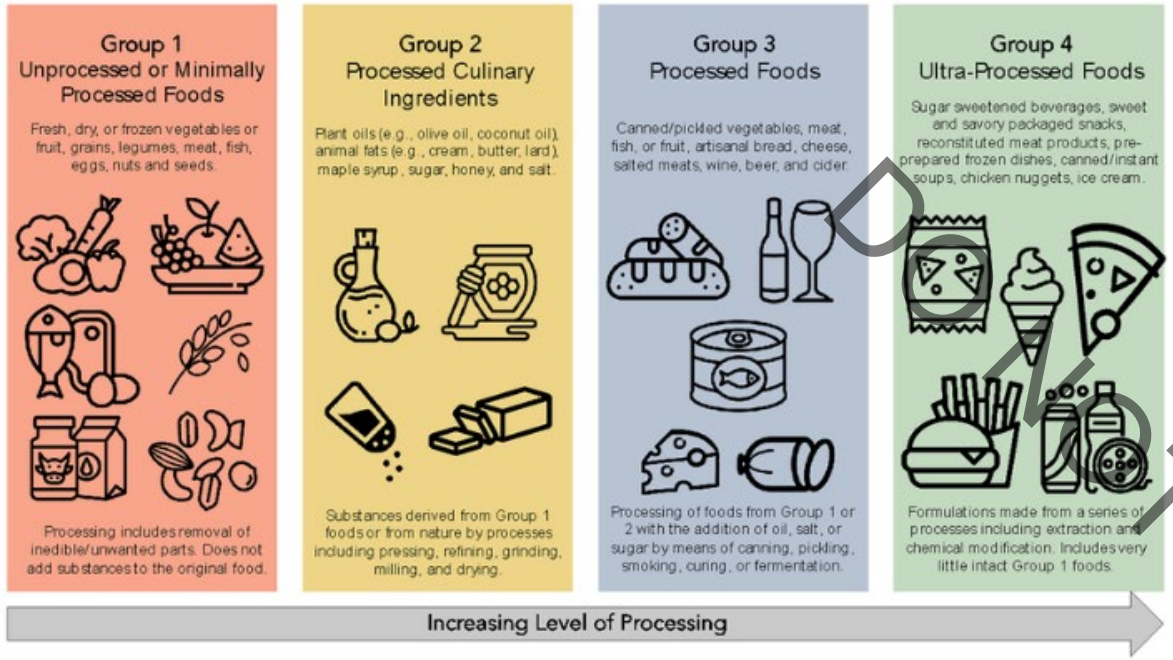
DUK guideline 2018

Dyson et al Diabetes UK

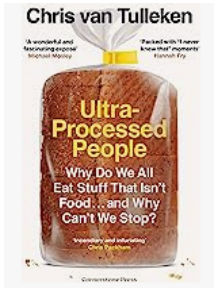
Intermittent fasting 5:2.
Time restricted eating 18:6. Macronutrient pre-loads.
Macronutrient sequencing

American Diabetes Association Primary Care Advisory Group. 5. Facilitating positive health behaviors and well-being to improve health outcomes: *Standards of Care in Diabetes—2024* abridged for primary care professionals. Clin Diabetes 2024;42:193–195 (doi: 10.2337/cd24-a005)

Ultraprocessed food



NOVA classification Monteiro 2018 Public Health Nutr 21 5-17



Formulations mostly of cheap industrial sources of dietary energy and nutrients plus additives containing minimal whole foods.

Why they are attractive:

- Inexpensive
- Long-shelf life
- Convenient – ready to heat or eat
- Higher palatability
- Important nutrients 'added back' and advertised
- Safe from infection

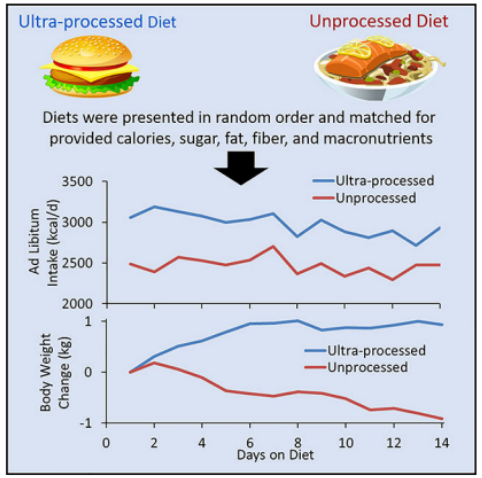
UK - UPF 51%-58% household dietary energy

'Good stuff removed and bad stuff added'

Remember food insecurity and have sensitive discussions

Engineered to have optimal mouth feel, maximal taste, attractive appearance and brain appeal. Likely addictive.

Ultraprocessed food



Published in final edited form as:
Cell Metab. 2019 July 02; 30(1): 67–77.e3. doi:10.1016/j.cmet.2019.05.008.

Hall K D et al

Ultra-processed diets cause excess calorie intake and weight gain: An inpatient randomized controlled trial of ad libitum food intake

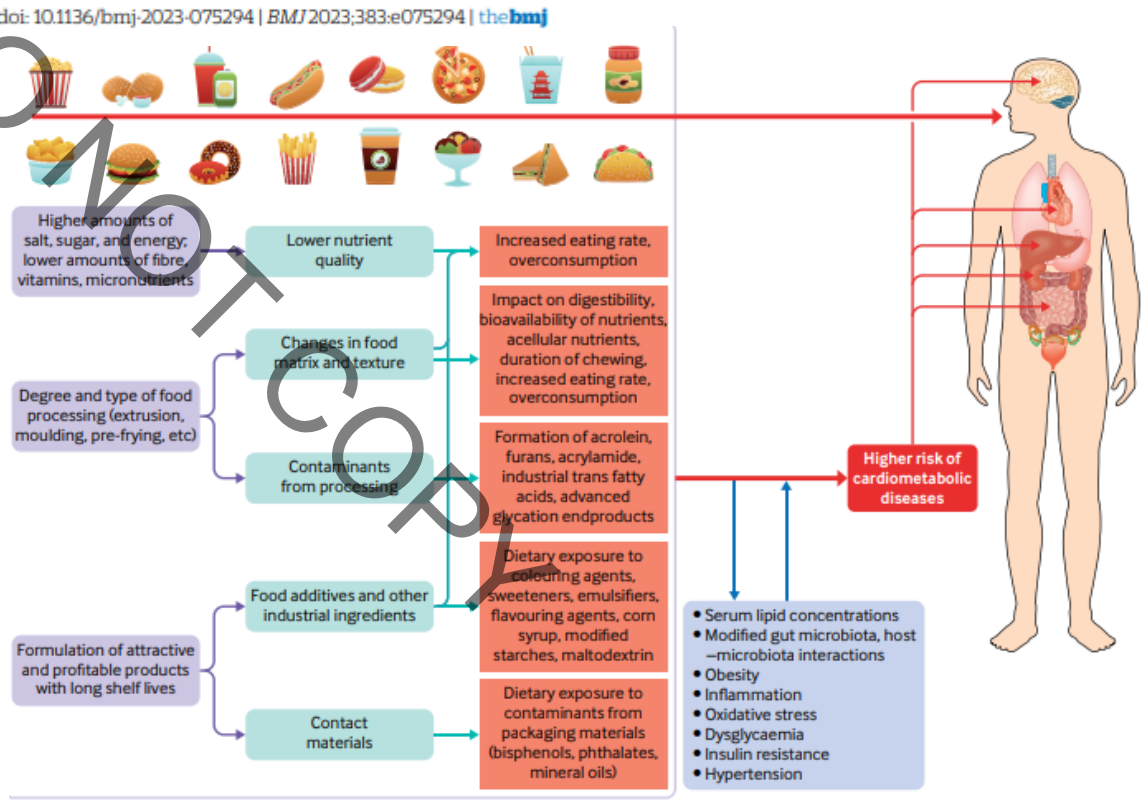
- ✓ Matched for calories, sugar, fat, fibre, macronutrients
- ✓ Ad libitum consumption – 500kcals more ultraprocessed v unprocessed
- ✓ 1kg weight gain on UPF over 2 weeks

Ultra-processed foods and cardiometabolic health: public health policies to reduce consumption cannot wait Touvier et al BMJ2023; 383:e075294

Swiss Re Institute

thebmj

Food for thought 2023
The science and politics of nutrition



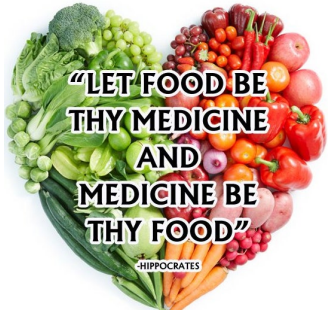
Is it the processing or nutritional deficiencies or packaging which cause problems?

Nutrition prescription in a nutshell

- Eat food. Not too much. Mostly plants. Michael Pollan
- Make each meal count – rainbow of fruit and veg, Mediterranean style, feed microbiome with high fibre, probiotics/prebiotics; avoid artificial sweeteners
- Cut out snacking; reduce/stop as much ultra-processed food as possible
- Consider intermittent fasting (16:8/5:2) as a way to reduce calories/weight
- Reduce alcohol, swap sugary drinks for water, coffee, black and green tea
- Remember food insecurity and cultural norms

Practical tips to make changes

- Hang new habits on old, take baby steps, explore what you feel able to change, ask yourself 'what am I willing to do to feel better'?
- Be more mindful when eating – why am I eating this food, what are the benefits or otherwise for my health and mood? Devices and diet should not mix!

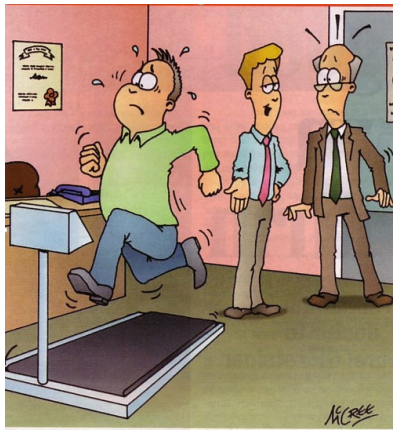


How optimal was your intake yesterday?
What will you choose to do differently today?

Think about the behaviour change you want to make – what are your barriers to change?

How might you overcome your barriers?

Behaviour change – how to help people with change

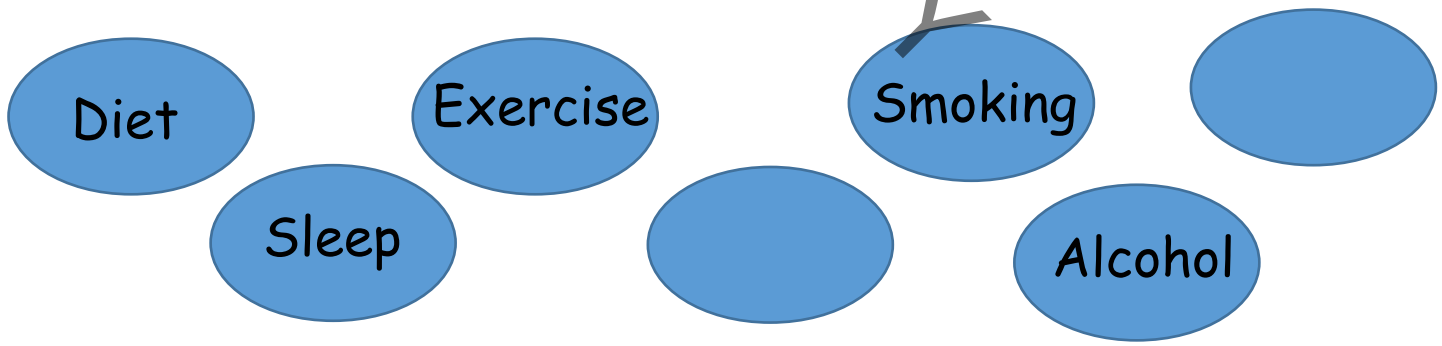


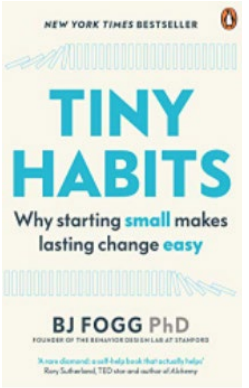
Diabetes review – ask open questions:

- ✓ How can I be of most help to you today?
- ✓ What do we need to make sure we talk about?
- ✓ How are things going with your diabetes at the moment?
  - ✓ What is going well?
  - ✓ What isn't gong as well as you would like?
  - ✓ Is there anything getting in the way of you looking after your diabetes?

Open up a lifestyle discussion - Use a bubble diagram to let people set their own agenda

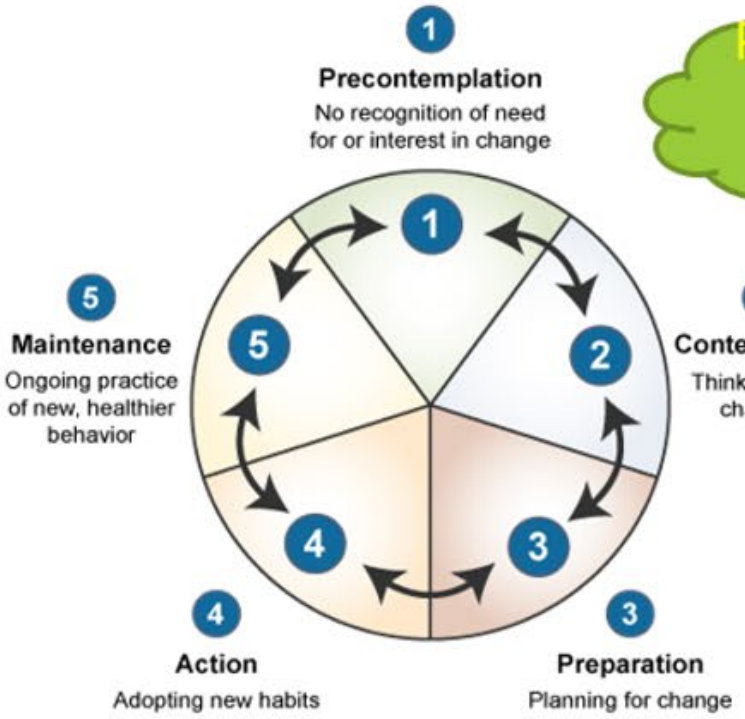
- ✓ Which area of your lifestyle do you think would be easiest to change that you think might help your diabetes/make you feel better?





Well-being questions Becky Haughton, Psychologist, Northern Health and Social Care Trust, N Ireland

How can we recognise if someone is ready to change?

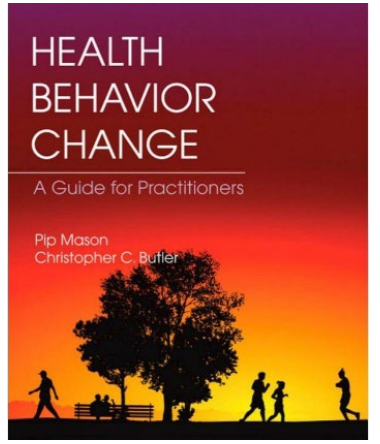


Pros<Cons
Sustain talk++

Pros=Cons
Ambivalence

Pros>Cons
Change talk++

"On a scale of 1 -10, with 10 at the top, how important is it to you to xxxxxx ?"
"Why is it an 8 not a 6?" Understanding and reinforcing importance

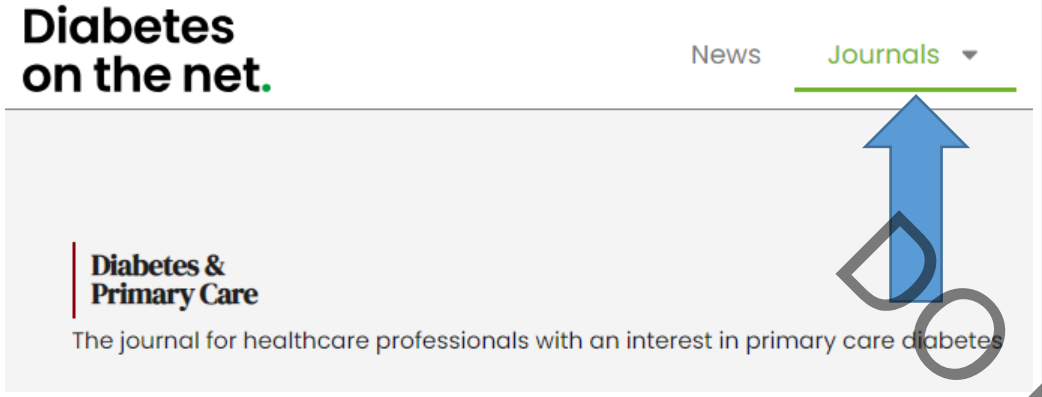


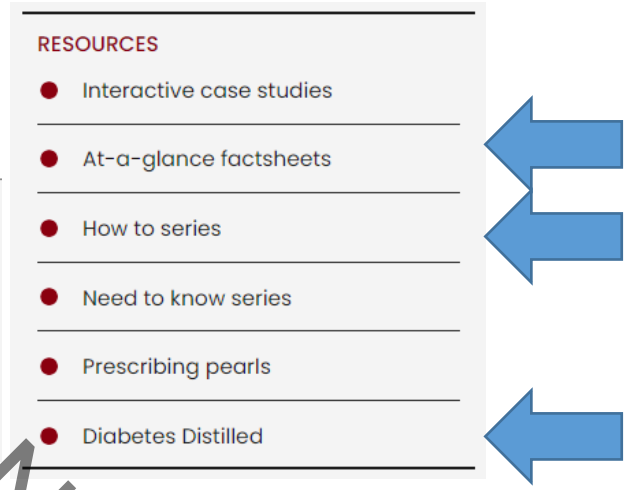
"What do you think about……"

"On a scale of 1-10, how confident are you that you can xxxxxx ?"
"Why is it a 6 and not a 4?" Explore their confidence
"What would it take to move you to an 8?"

https://www.wwselfmanagement.ca/userContent/documents/English/Professional/Resources/3_Minutes_Empowerment.pdf

https://diabetesonthenet.com/journals/





diabetesdistilled
the latest developments filtered for you

bitly

Diabetes Distilled: Physical activity – how much is needed to optimise glycaemic control?

Do people with type 2 diabetes need more physical activity than is recommended for the... general population?

6 Mar 2024

Diabetes Distilled: Smoking cessation cuts excess mortality rates after as little as 3 years

The mortality benefits of smoking cessation may be greater and accrue more... rapidly than previously

2 Apr 2024

Diabetes Distilled: Optimising sleep – simple questions and goals

The importance of sleep in type 2 diabetes management

8 Jul 2024

Diabetes Distilled: Ultra-processed foods linked to poor health outcomes

New cohort study and two systematic reviews link high intake of ultra-processed food... and drink to increased risk of

18 Sep 2023

Diabetes Distilled: Lifestyle change for microvascular gain

Five healthy behaviours to reduce microvascular complications in people with... type 2 diabetes.

20 Jul 2023

Diabetes Distilled: I would walk 10 000 steps but should I walk 10 000 more?

Increasing daily step count reduces mortality and morbidity up to around 10 000... steps, with no minimum step

10 May 2023

Diabetes Distilled: Even short-term time-restricted eating improves glycaemic control

Time-restricted eating may be an effective additional strategy for glycaemic management in... type 2 diabetes.

9 Aug 2022

At a glance factsheet

Intermittent fasting for the management of weight and diabetes

https://diabetesonthenet.com/wp-content/uploads/81.-Factsheet_Intermittent-fasting.pdf

Lifestyle discussions for people with type 2 diabetes: An overview

https://diabetesonthenet.com/wp-content/uploads/DPC_23-6_187-191-1.pdf

Lifestyle discussions: Physical activity and type 2 diabetes

https://diabetesonthenet.com/wp-content/uploads/DPC_24-2_37-39.pdf

Lifestyle discussions: Stress and type 2 diabetes

https://diabetesonthenet.com/wp-content/uploads/7-8.-Stress-factsheet.pdf

Lifestyle discussions: Sleep and type 2 diabetes

https://diabetesonthenet.com/wp-content/uploads/DPC_24-6_193-195.pdf

Diabetes & Primary Care

Interactive case studies from David Morris

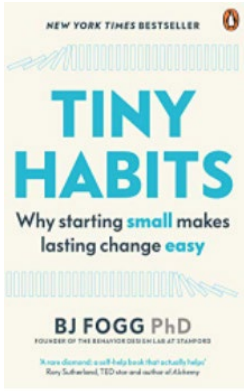
Obesity and type 2 diabetes

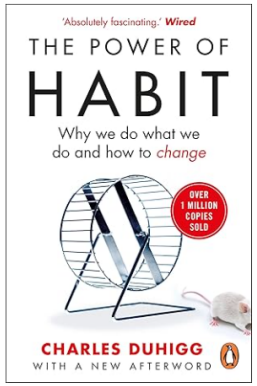
https://diabetesonthenet.com/cpd-module/obesity-and-type-2-diabetes/

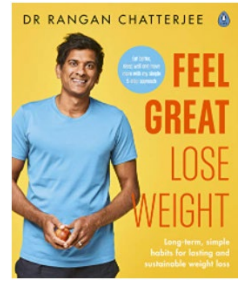
Fatty liver disease and type 2 diabetes

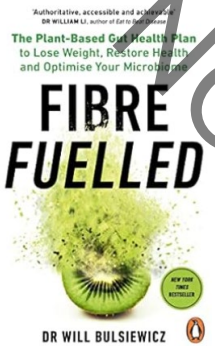
https://diabetesonthenet.com/cpd-module/fatty-liver-disease-type-2-diabetes/

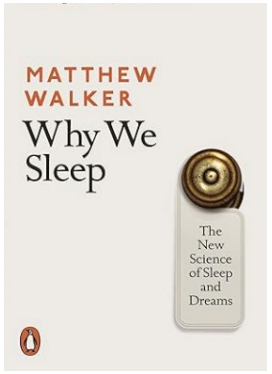
Behaviour change – understanding what works and specific guidance

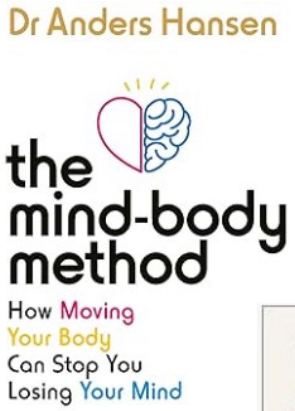


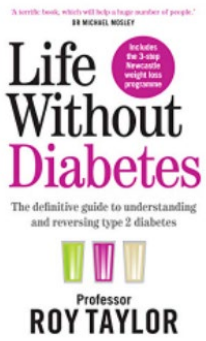


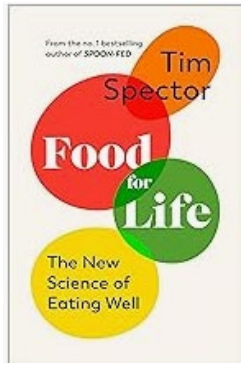


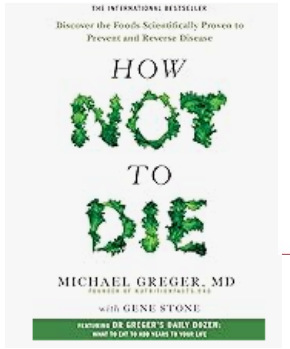


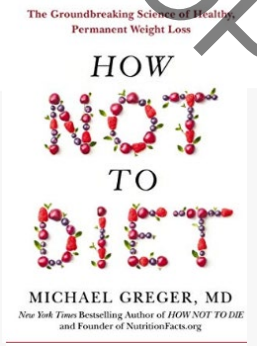


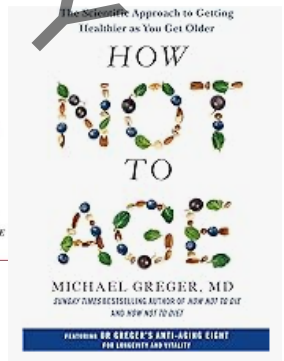


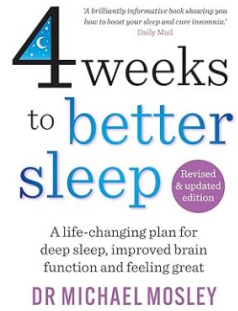












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