



# **Approaches to empower individuals to adopt and maintain healthy lifestyle to reduce the risk of type 2 diabetes**

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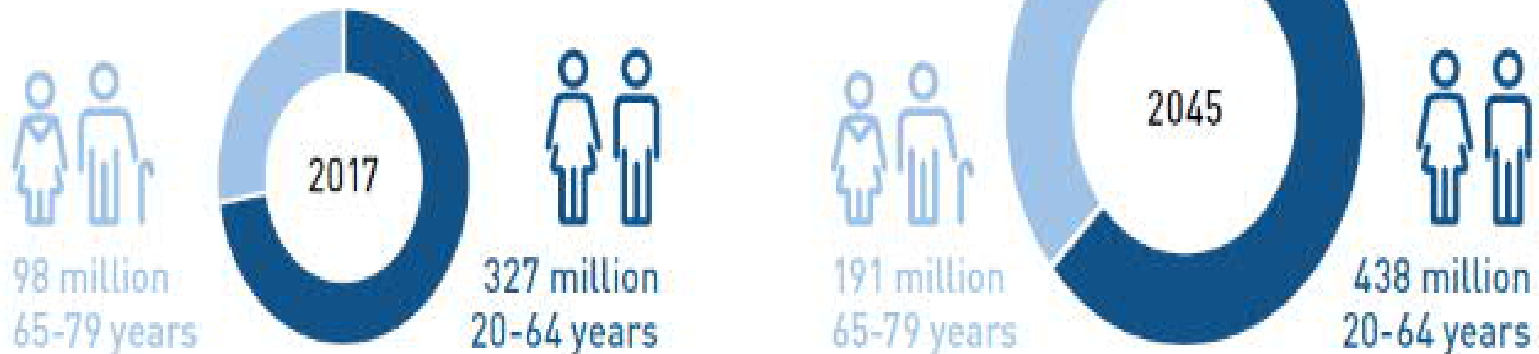
**National Institute for Health and Welfare**

**Helsinki, Finland**

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# Diabetes around the world

Diabetes by age (20-79 years)



425 million



629 million\*

\* Estimation based on age distribution and population growth



# Type 2 diabetes risk factors

## Risk markers

- Age
- Family history
- Gestational diabetes
- Delivery of macrosomic baby
- Ethnicity
- Low socioeconomic status
- Low birth weight
- Metabolic syndrome
- Previous CVD
- Polycystic ovary syndrome PCOS
- Non-alcoholic fatty liver disease NAFLD

## Modifiable risk factors

- Overweight / obesity
- Abdominal obesity
- Low physical activity
- Unhealthy diet

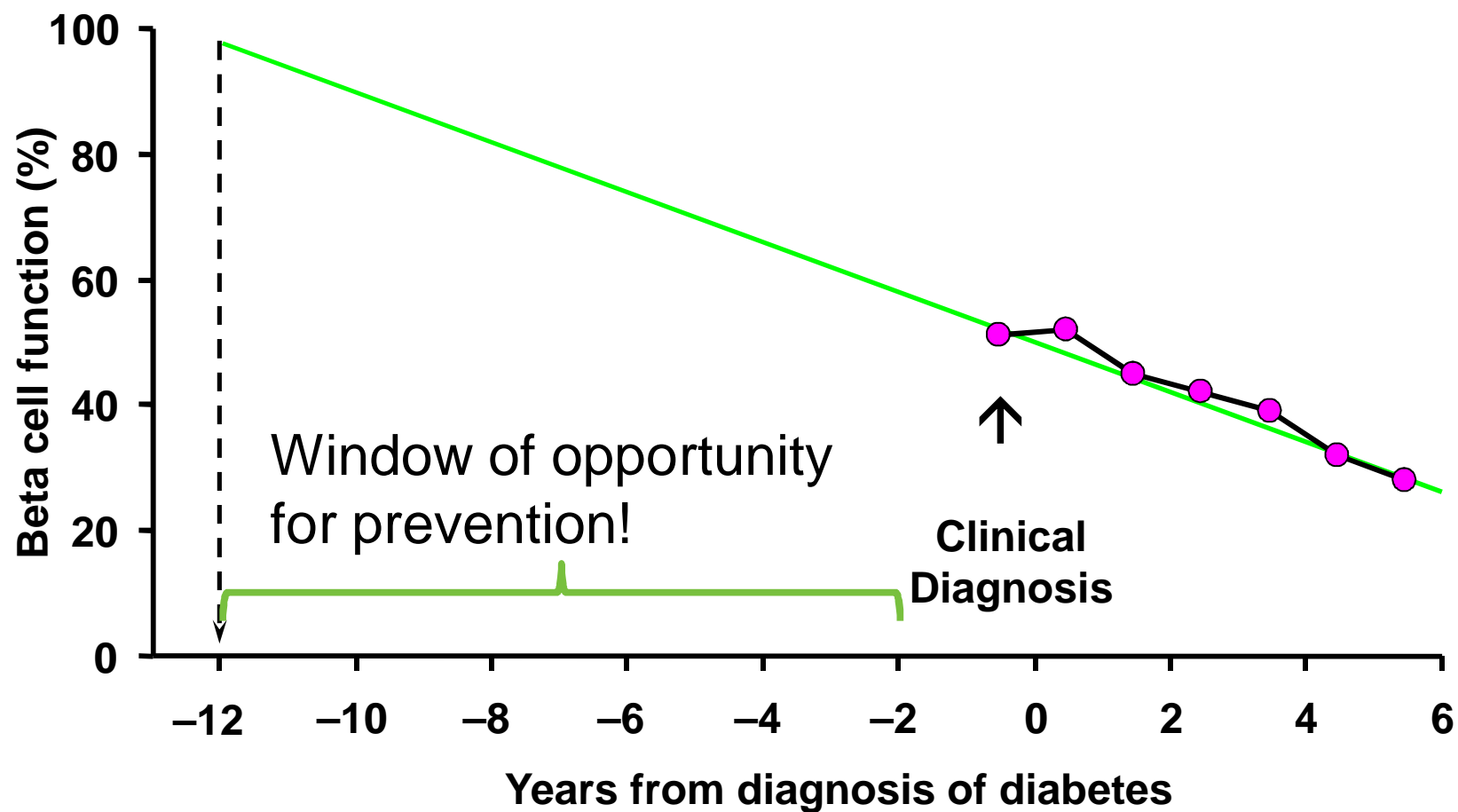
## Possibly modifiable risk factors

- Smoking
- Sleep deprivation
- Distress and depression
- Persistent organic pollutants (e.g. pesticides, solvents, pharmaceuticals)
- Intestinal bacterial flora



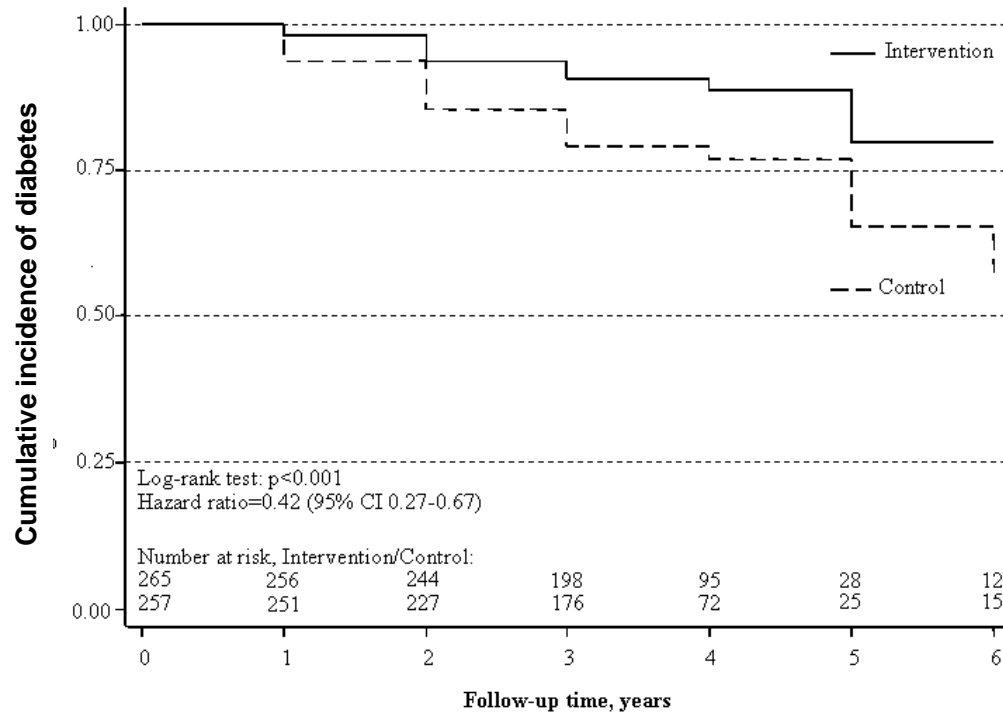


## Extrapolation of the time of deterioration of pancreatic beta cell dysfunction



Adapted from UKPDS 16. Diabetes 1995

# The Finnish Diabetes Prevention Study (DPS) showed for the first time that type 2 diabetes is preventable



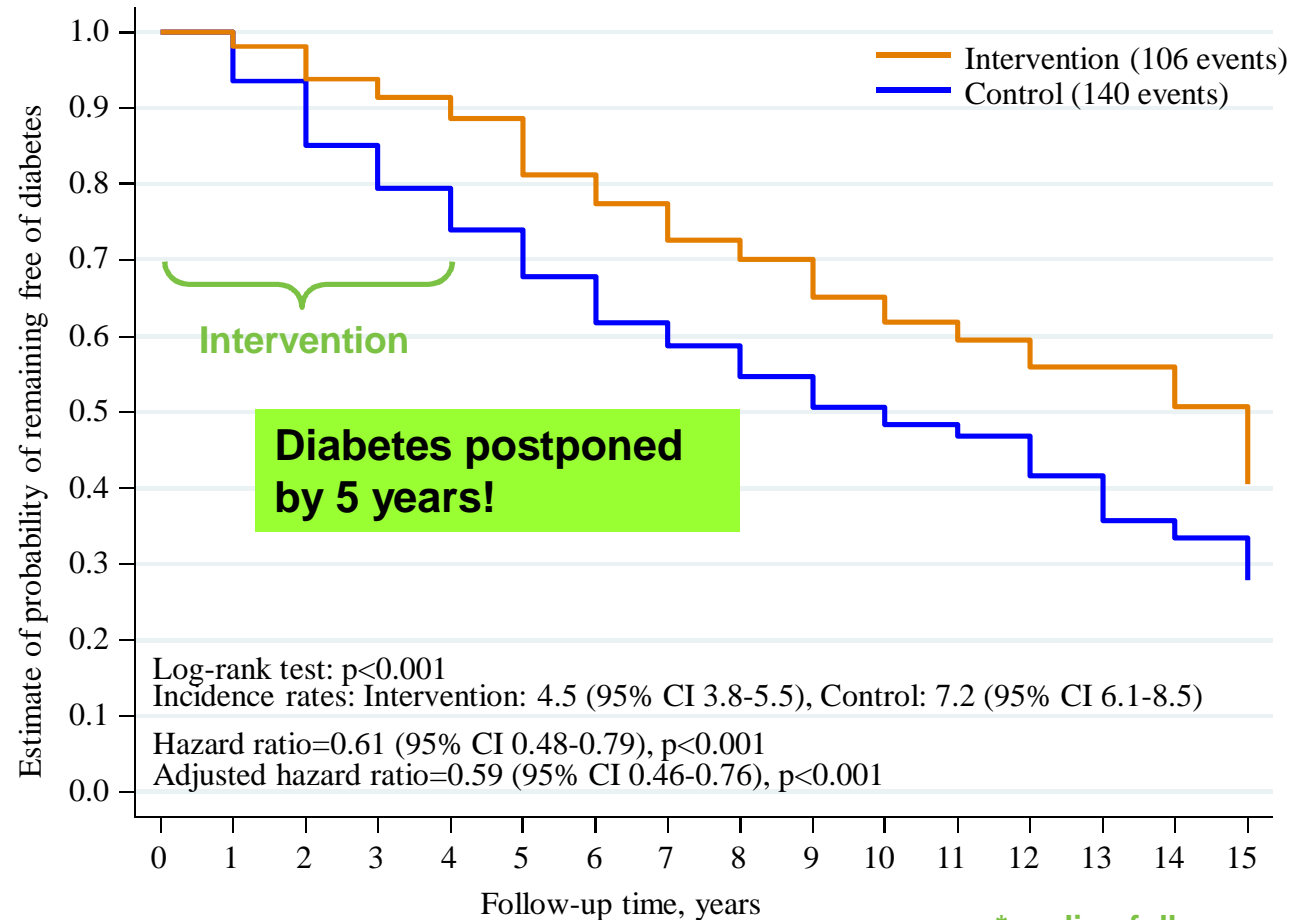
- Weight reduction  $\geq 5\%$
- Moderate fat  $< 30\%$
- Low saturated fat  $< 10\%$
- High fibre  $\geq 15\text{g}/1000\text{kcal}$
- Physical activity  $\geq 30$  min / day

Diabetes incidence was 58% lower among the intervention group compared with the control group after mean follow-up of 3,2 years

Tuomilehto et al. N Engl J Med 2001; 344:1343-1350



# Diabetes incidence was 39% lower among the intervention group compared with the control group over 13 years\*



Number at risk

Intervention	261	238	193	158	83	10
Control	251	209	158	120	63	6

Adjusted HR: Adjusted for sex, age, 2h glucose and BMI at baseline.



## DPS: Lifestyle counselling was practical, continuing, interactive, individualised, and provided by trained professionals

➤ 7 individual counselling sessions during the 1st year, and every three months thereafter → 4 years mean intervention

➤ Increase all physical activity + free gym

➤ Dietary counselling based on food diaries:

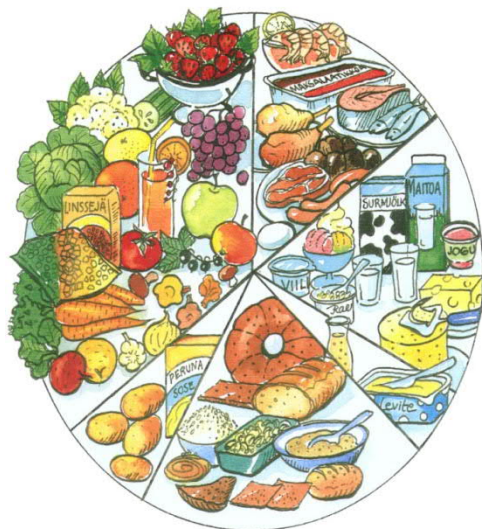
- Regular meal pattern
- Whole grains instead of refined grains
- Daily abundant consumption of fruit and vegetables
- Vegetable oils and margarines in moderation
- **Substitute** energy-dense foods containing saturated fat, sugar, or alcohol with lower-energy items
- 'The plate model' to estimate portion sizes



National Nutritional Council



# DPS: Tools for information, self-monitoring and goal-setting



## Food Diary



oliko päivä tavallinen... vai poikkeava, miten? Söin illalla ravintolassa

AIKA	PAIKKA	RUOAT JA JUOMAT (LAATU JA VALMISTUSTAPA)	SYÖTY MÄÄRÄ GRAMMOINA
7.10	KOTI	KAURAPUUROA (VETEEN KEITETTY)	230
		YKKOSMAITOA	150
		VOITTA (PUURON SILMAKSI)	10
		KAHVIA (SUODATIN)	170
		SOKERIA (TAVALLISTA PALASOKERIA)	2 PALAA
		KUOHUKERMAA	15
		KORVAPUUSTI (TAIKINASSA KULUTUSMAITOA)	50
		JASUNNUNTAI-LEIVONTAMARGARIINIA	
12.30	KOTI	JAUHELIIHAPIHVEJÄ (SAARIOINEN, MIKROSSA)	85
		RUSKEAA KASTIKETTA (VOIHIN TEHTY)	100
		PERUNOITA (KEITETTY KUORINEEN)	210
		PORKKANARAASTETTA	60
		ÖLJYKASTIKETTA (VIIINIETIKKÄÄ JA RYPSI-ÖLJYÄ 1:3)	15
		KAURALEIPÄÄ (FAZERIN KAURAPUIKULA)	1 VIIIPALE
		FLORAA (60% RASVAA, LAKTOOSITON)	6
		VANILJAKERMAJÄATELOA	125
		KASTIKETTA (VALIO)	30
			110
		ERMAA	10
			1 PALA
		TA (KOTIMAISIA, PIENIÄ) 2 KPL	2 X 70
			JNE.

Weight chart



My goals:

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_



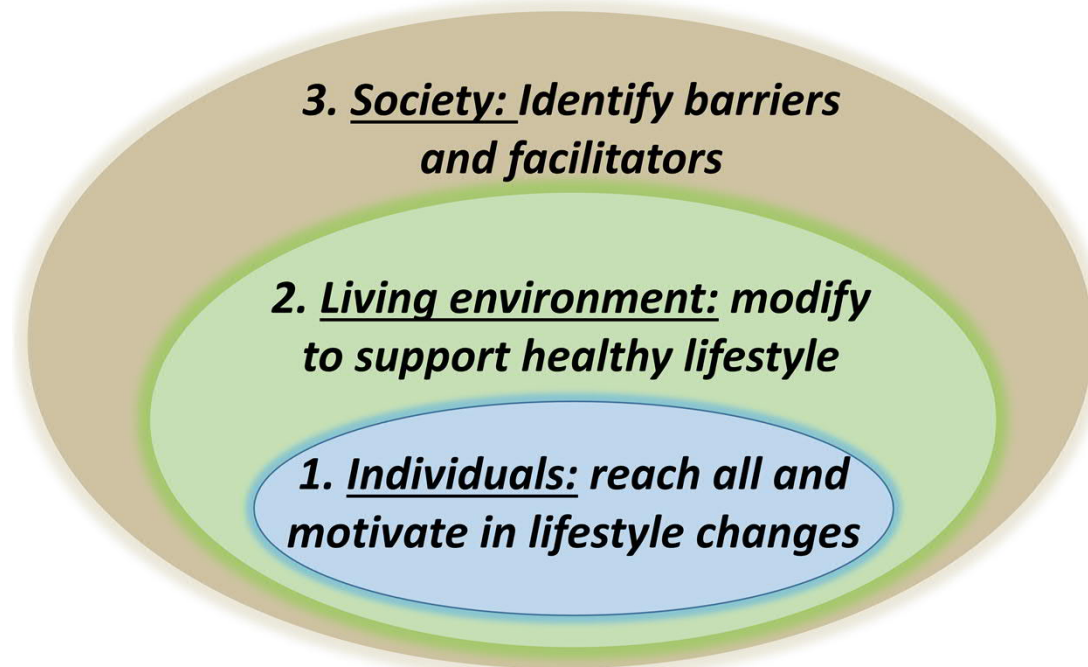
- **To target the preventive activities, we need to identify individuals at risk**
- **To prevent (or postpone) diabetes, individuals at risk have to change their behaviour (diet, physical activity etc.)**
- **Behaviour can be changed**
  - **consciously, by making a decision**
  - **automatically, as a result of environmental cue or pressure**



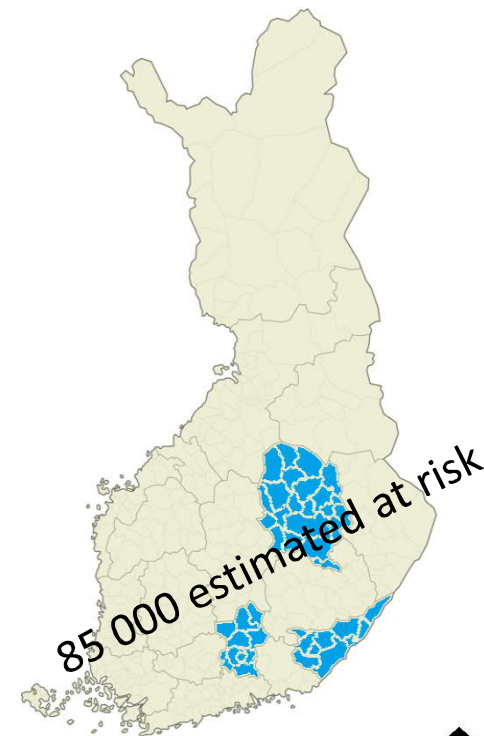
**STOP DIABETES**  
**- knowledge-based solutions**



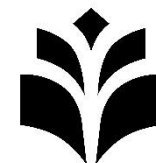
Pannaan stoppi tyypin 2 diabetekselle. [#stopdia](#) | [stopdia.fi](#)



**Central idea of StopDia project:  
Three levels of action to stop diabetes**



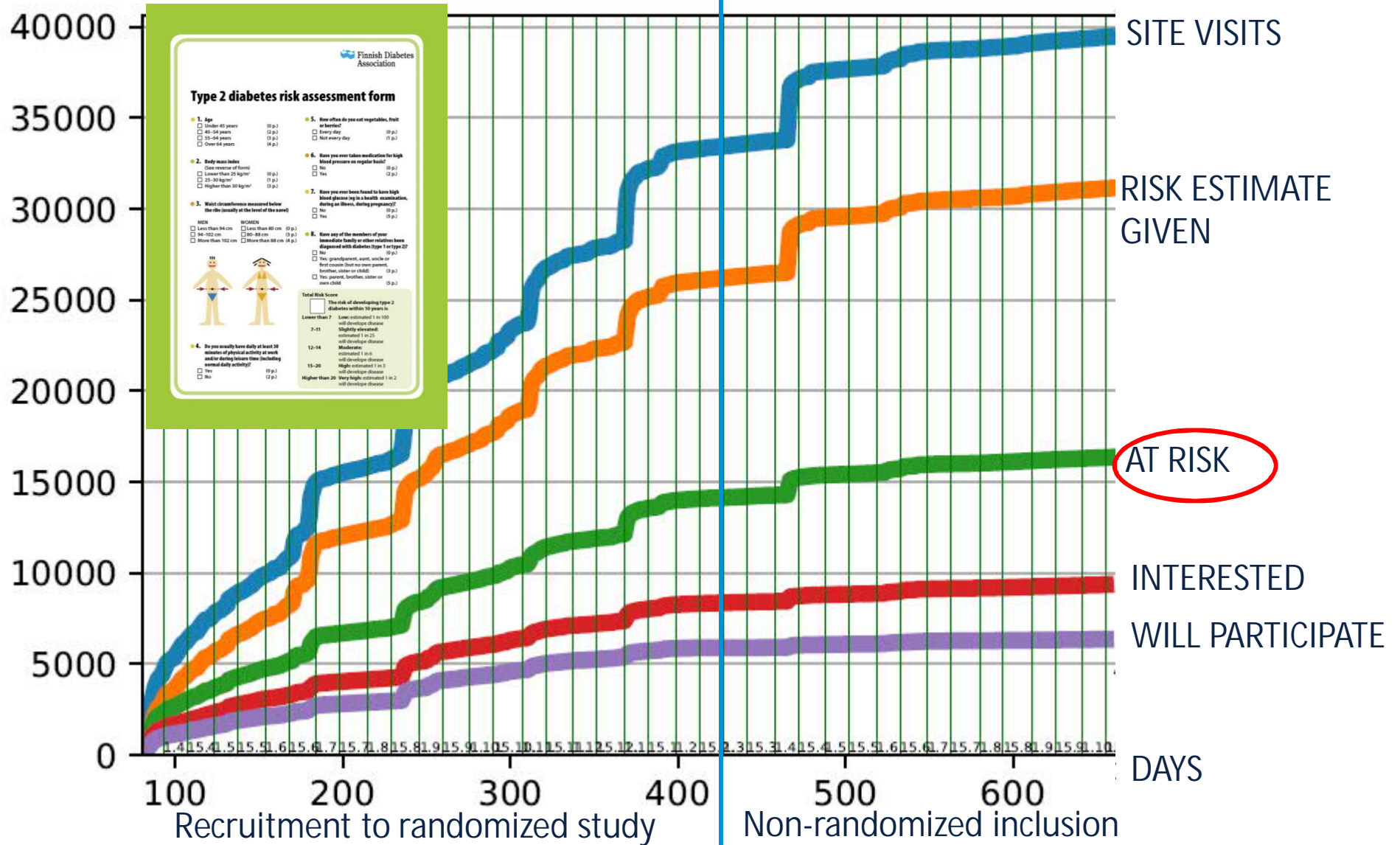
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# Step 1: Online risk assessment and recruitment



**StopDia**  
 Finnish Diabetes Association

**Type 2 diabetes risk assessment form**

- Age**
  - Under 45 years (0 p.)
  - 45-54 years (2 p.)
  - 55-64 years (3 p.)
  - Over 64 years (4 p.)
- Body mass index** (See reverse of form)
  - Lower than 25 kg/m<sup>2</sup> (0 p.)
  - 25-30 kg/m<sup>2</sup> (1 p.)
  - Higher than 30 kg/m<sup>2</sup> (3 p.)
- Waist circumference measured below the ribs (locally at the level of the navel)**

SEX	WOMEN
<input type="checkbox"/> Less than 84 cm (0 p.)	<input type="checkbox"/> Less than 80 cm (0 p.)
<input type="checkbox"/> 84-102 cm (3 p.)	<input type="checkbox"/> 80-88 cm (3 p.)
<input type="checkbox"/> More than 102 cm (4 p.)	<input type="checkbox"/> More than 88 cm (4 p.)
- Do you usually have daily at least 30 minutes of physical activity at work and/or during leisure time (including normal daily activity)?**
  - Yes (0 p.)
  - No (2 p.)
- How often do you eat vegetables, fruit or berries?**
  - Every day (0 p.)
  - Not every day (1 p.)
- Have you ever taken medication for high blood pressure on regular basis?**
  - No (0 p.)
  - Yes (2 p.)
- Have you ever been found to have high blood glucose (eg in a health examination, during an illness, during pregnancy)?**
  - No (0 p.)
  - Yes (3 p.)
- Have any of the members of your immediate family or other relatives been diagnosed with diabetes (Type 1 or Type 2)?**
  - No (0 p.)
  - Yes: grandparent, aunt, uncle or first cousin (but no own parent, brother, sister or child) (3 p.)
  - Yes: parent, brother, sister or own child (5 p.)

**Total Risk Score**

The risk of developing type 2 diabetes within 10 years is:

- Lower than 7: Low: estimated 1 in 100 will develop disease. Slightly elevated: estimated 1 in 25 will develop disease.
- 7-11: Moderate: estimated 1 in 6 will develop disease.
- 12-14: High: estimated 1 in 3 will develop disease.
- 15-20: Very high: estimated 1 in 2 will develop disease.



## Step 2: Lifestyle interventions



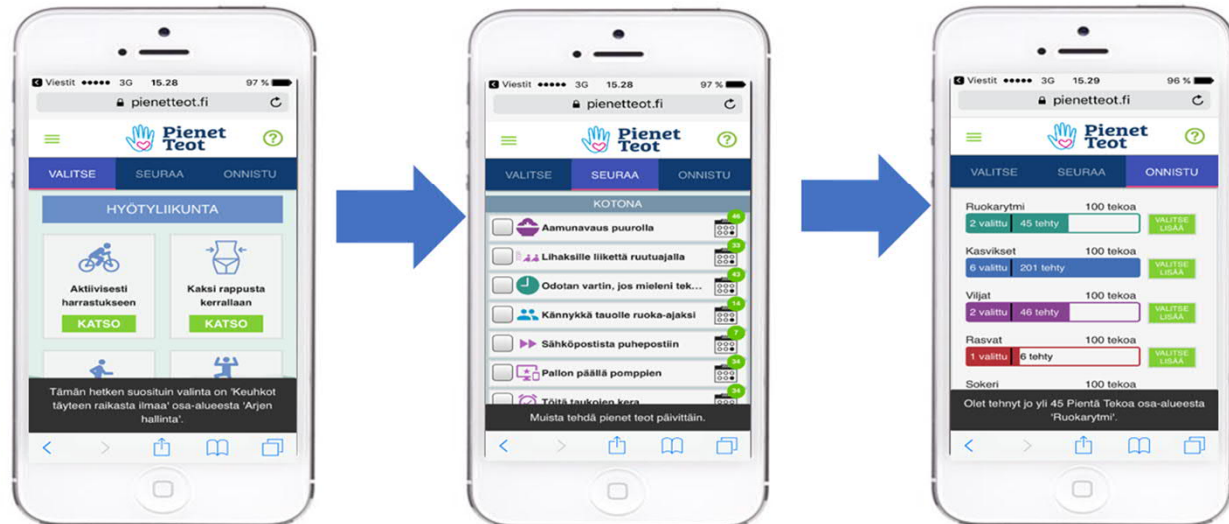
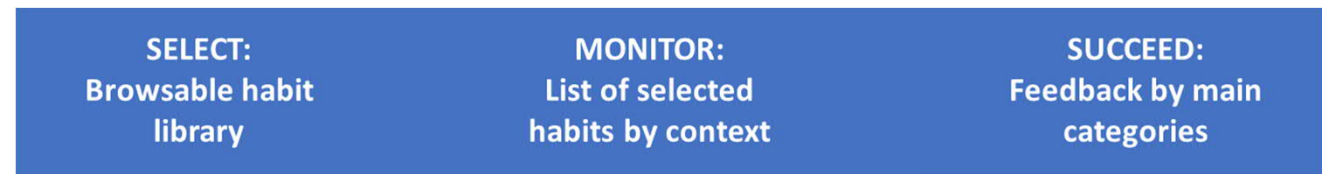
### A) Group counselling in primary health care

- By trained public health nurses
- 6-session course spread over 16-20 weeks
- Intervention based on self-determination and self-regulation theories

### B) Digital lifestyle intervention:

#### BitHabit\* Web App

- Application is based on *Fogg's Tiny habit*- ideology
- Includes healthy habit library

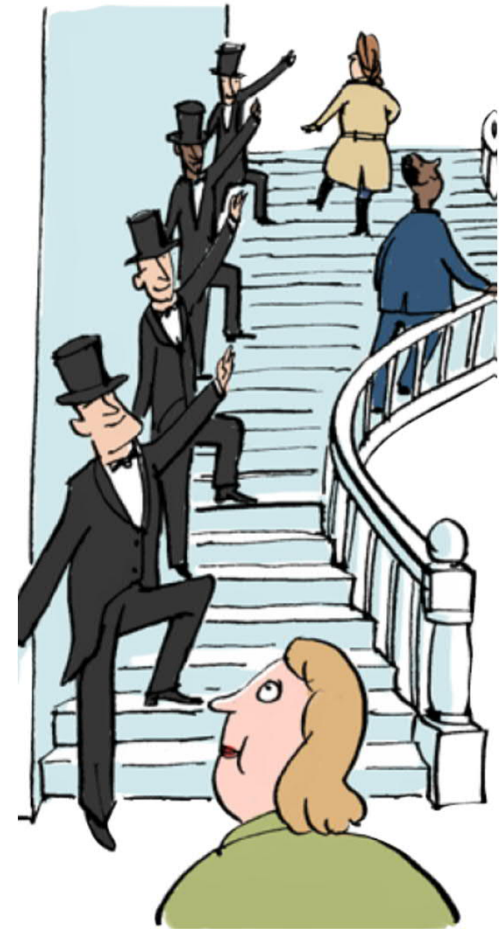


\* Developed by VTT

# Step 3: Environmental interventions to support healthy lifestyle in workplaces



- **Nudge Toolbox to modify living environment:** “make the healthy choice the preferred choice”.
- “Altering the properties of placement of objects or stimuli within micro-environments with the intention of changing health-related behaviour”
- Hollands et al. BMC Public Health 2013



Marteau et al. BMJ, 2011



## ➤ **What we already know**

- Type 2 diabetes is preventable by providing lifestyle change support to individuals at risk
- Must invest on coverage and reach of risk identification and uptake of interventions
- Must invest on lifestyle counselling – education of health care personnel

## ➤ **What StopDia will tell us**

- Which risk identification strategies work best and for whom?
- Can online/mobile tools complement (replace?) the “traditional” intervention modes in diabetes prevention? If so, in what population groups?
- Can we “nudge” people towards more healthy behaviours?
- What are the effects on costs?



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