



Kan ökad sjukdomsinsikt ge minskad risk?

VIPVIZA in the context of the non-adherence problem in prevention

Ulf Näslund

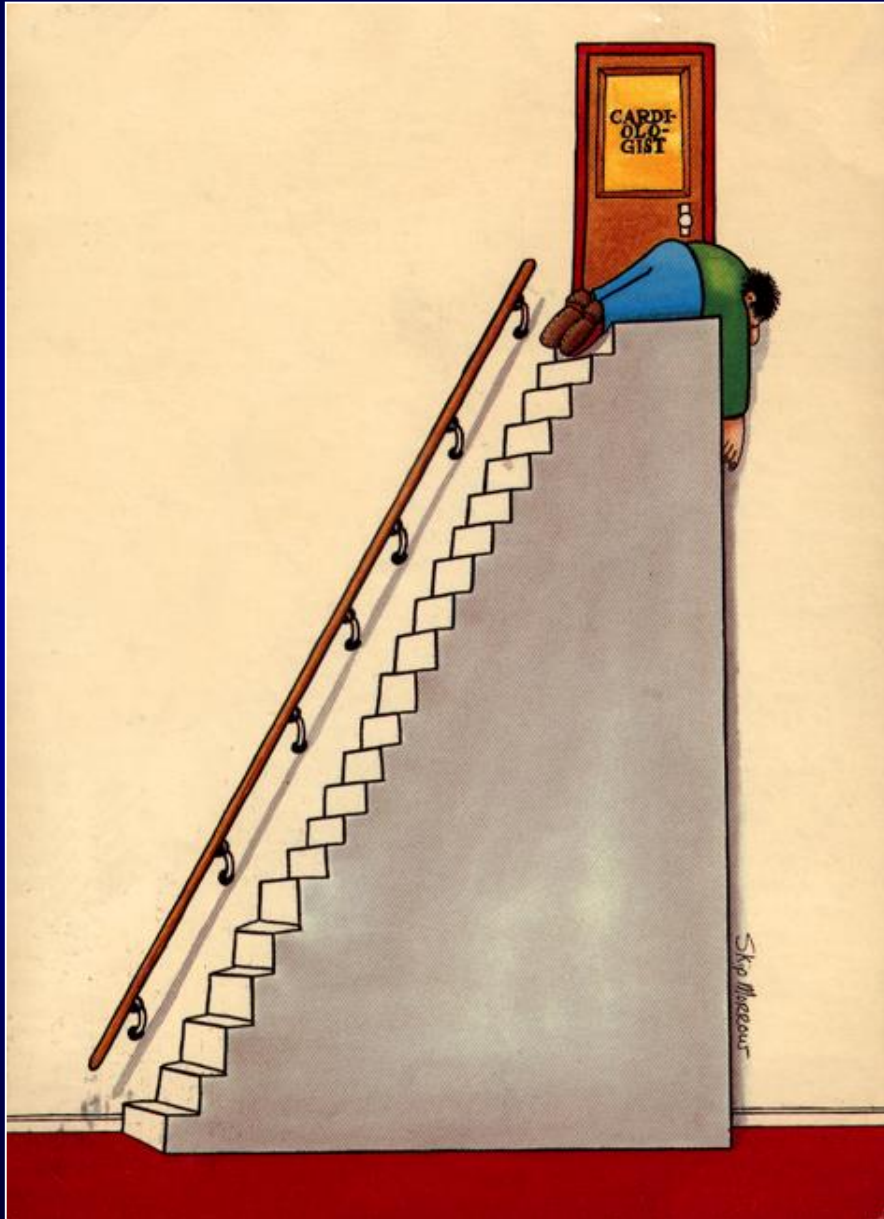
Hjärtcentrum

Institutionen för folkhälsa och klinisk medicin

Umeå Universitet

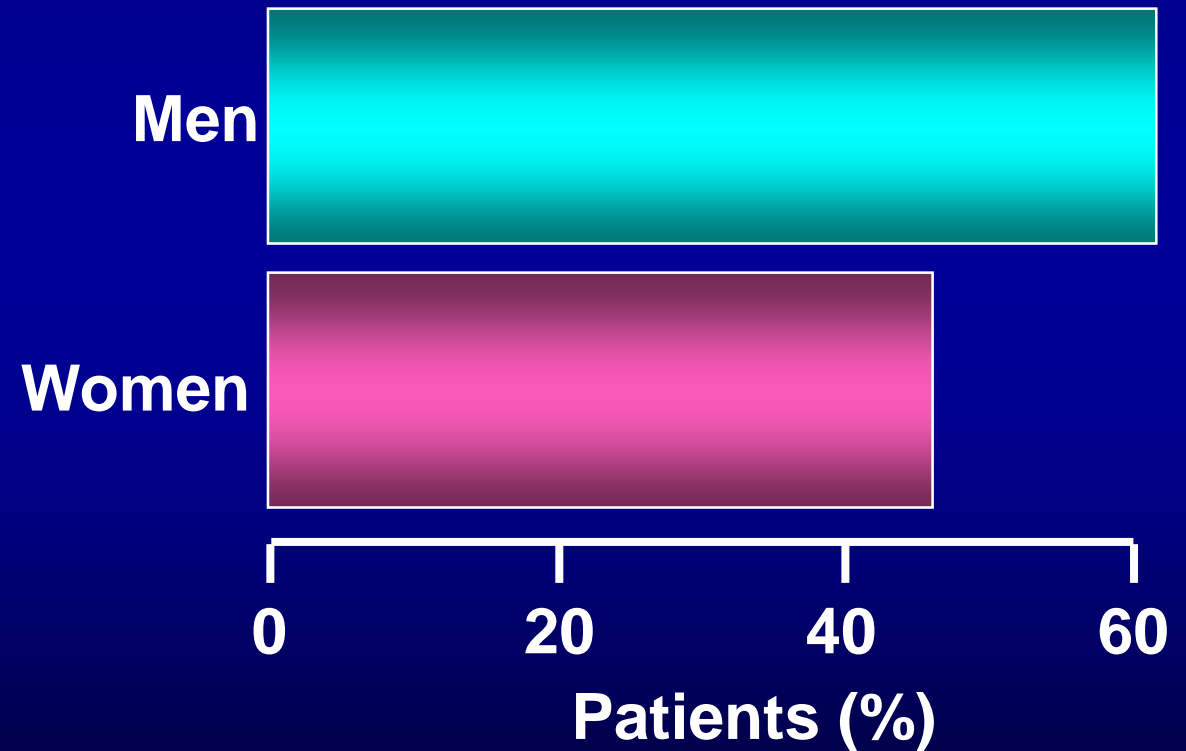
**Plötslig död, stroke
eller hjärtinfarkt är
första symptom för
>50% av de som har
atheroscleros
(åderförkalkning).**

First Presentation may be the Last!



Framingham Heart Study (n=5144)

MI or SD as 1st Presentation



Murabito et al Circ 1993 88: 2548



Hälsoscreening och prevention

Rökning

Fysisk aktivitet

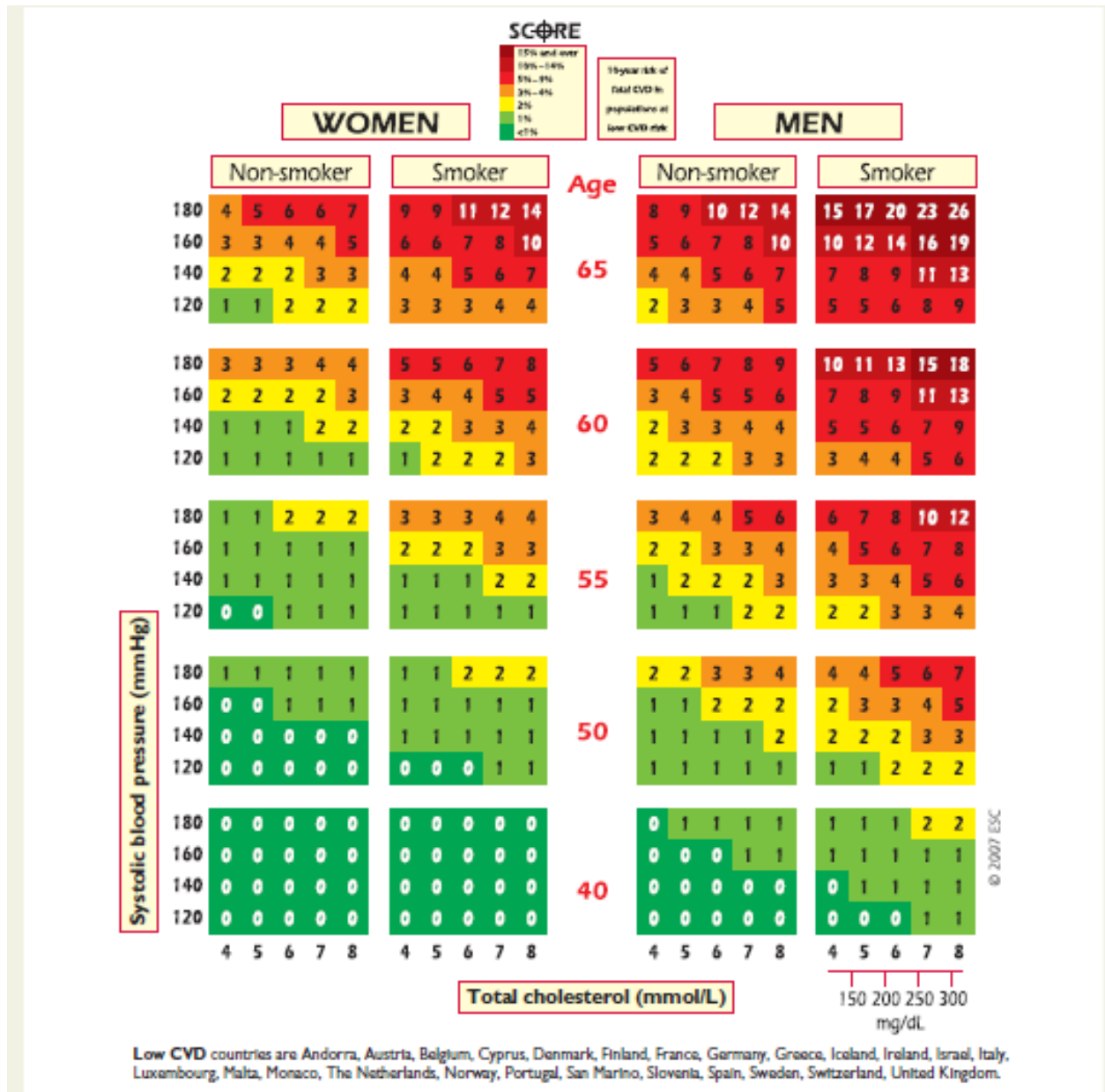
Kost

Blodtryck

Kolesterol

Diabetes

Ärftlighet



Low CVD countries are Andorra, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, The Netherlands, Norway, Portugal, San Marino, Slovenia, Spain, Sweden, Switzerland, United Kingdom.

Figure 4 SCORE chart: 10-year risk of fatal cardiovascular disease (CVD) in countries at low CVD risk based on the following risk factors: age, sex, smoking, systolic blood pressure, and total cholesterol. Note that the risk of total (fatal + non-fatal) CVD events will be approximately three times higher than the figures given.

Who Has More Cardiovascular Risk Factors?

Sir Winston Churchill, 91 †



- Overweight
- Not Fit
- Heavy Smoker

Jim Fixx, 53 † ❤️



- Not Overweight
- Very Fit
- Non-Smoker



**Traditionell riskfaktor screening
“misslyckas” med att identifiera
individen med risk och
välja bästa strategi för individen**

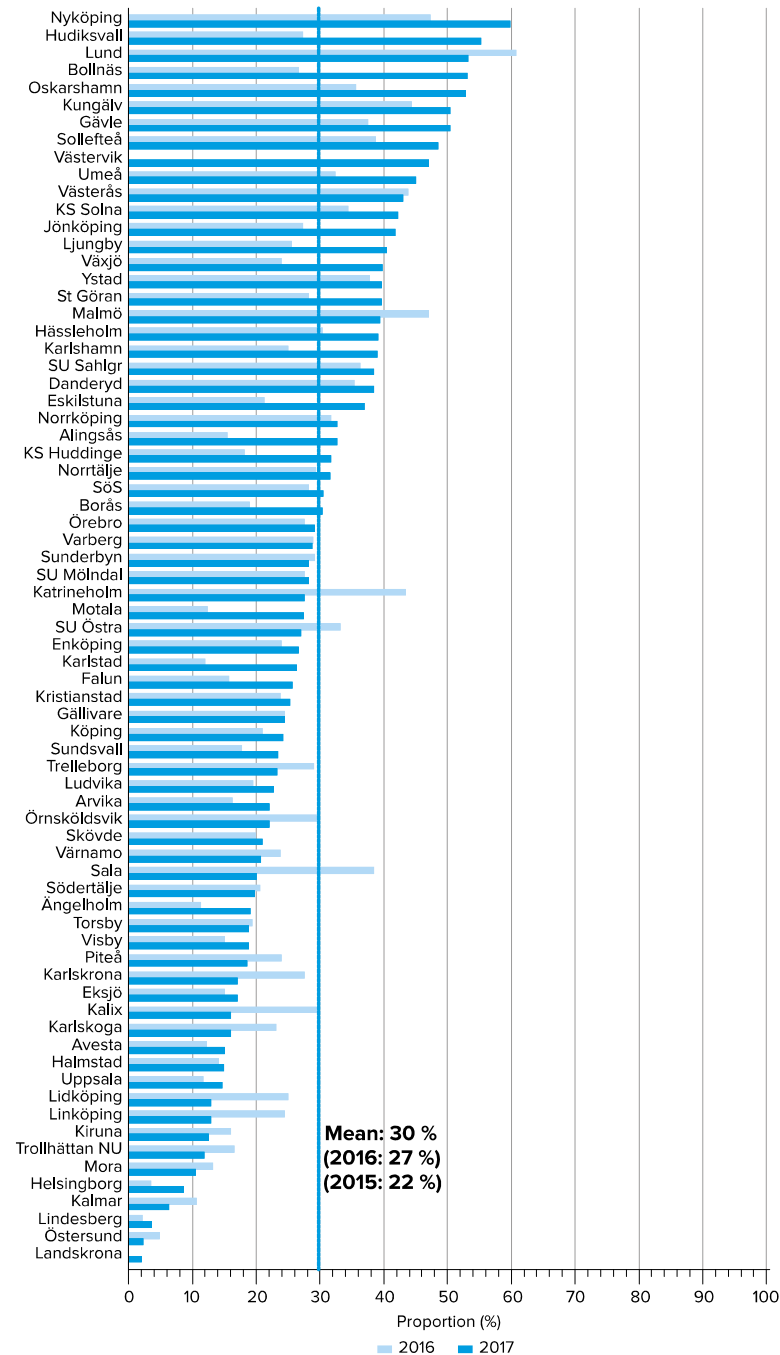


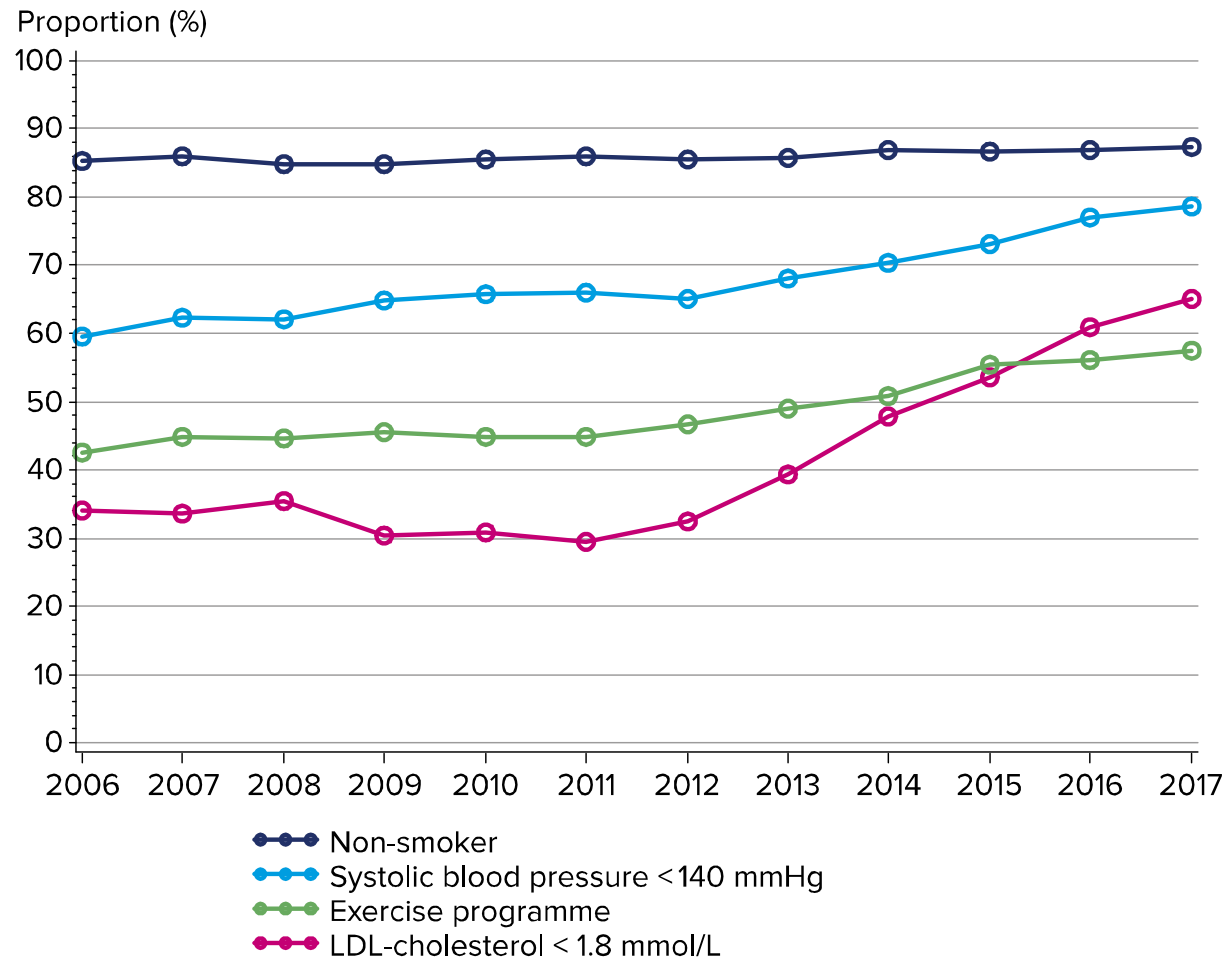
Figure 26. Quality indicator: Q4 at 2nd follow-up.

Proportion of patients reaching 4 out of 4 prevention goals (Q4): systolic blood pressure < 140 mmHg, LDL-cholesterol < 1.8 mmol/L ($\geq 50\%$ reduction from baseline, or apoB < 0.8 g/L), no daily smoking, and participation in a physical exercise program at the 2nd follow-up. The proportion of patients reaching the Q4 goals continues to increase year by year.



Figure 30. Quality indicator: trend in Q4 attainment, 2006–2017.

Proportion of patients at goal for systolic blood pressure < 140 mmHg, LDL-cholesterol < 1.8 mmol/L ($\geq 50\%$ reduction from baseline, or apoB < 0.8 g/L), no daily smoking, and participation in a physical exercise program at the 2nd follow-up, per year 2006–2017. While the proportion of patients reaching goals for blood pressure, LDL cholesterol and exercise training keeps increasing, the number of current smokers at the 2nd follow-up has remained unchanged for more than 10 years.





Missed opportunities

24% CVD risk calculated

50-69% eligible for Prim Prev were treated appropriately for their CVD risk

50-80% guideline lipid-lowering prescription
86-88% guideline antihypertensive prescript.

29-56% reached BP target

Sheppard et al. Br J of General Practice 2014; 64: 618



Non-adherence to guidelines

- Around 40% reach treatments goals for BP, cholesterol and HbA1c, less for BMI
- 50-70% use of guidelines and SCORE

Eur Heart J 2011;32:2143-52

Dalongeville et al. Eur J Prev Cardiol 2012

Sckmieder et al. Vasc Health and Risk Management 2012



Non-adherence to guidelines

Adherence to Blood Cholesterol Treatment Guidelines Among Physicians Managing Patients With Atherosclerotic Cardiovascular Disease

US, Massachusetts:
Acute coronary syndrome
ACC/AHA 2013 guidelines

<50% treated

Ramsaran R et al. Am J Card 2019;124:169-75



Behandling av kolesterol och blodtryck

50-80%

#

25-75%

#

12-60%

I verkligheten



Prevention fails...

- # Life style changes – words, no action
- # Non-compliance with guidelines
- # Statins, anti-hypertensives not prescribed
- # Prevention not sustained
- # Prevention not individualised, person-centered...



Prevention fails...

”Message not taken”

Psykologiska försvar

Motiverar inte till förändring

Risikkommunikation, riskperception!





Av allt påverkbart...

**Non-adherence
and
non-compliance**

”the elephant in the room”

Kones R. Vasc Health and Risk Management 2013

LOW ADHERENCE





Behöver vi nya behandlingar?



Evidensbaserad behandling

Rökstopp

Fysisk aktivitet

Kost

Blodtrycksbehandling

Statiner, kolesterolsänkning

Diabetes kontroll

”Enkelt och billigt...”



Risikommunikation

patienter

vs

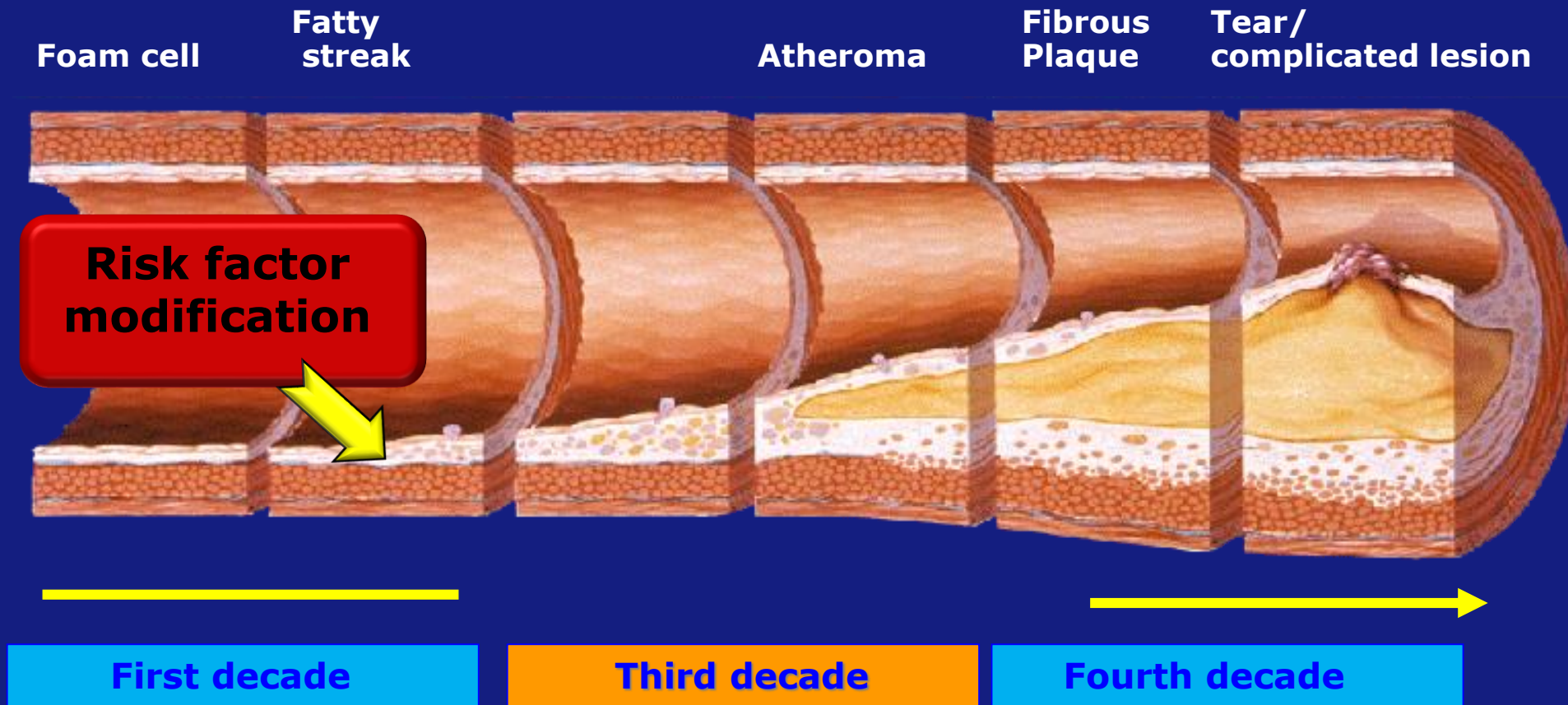
kunder...

handeln

vs

hälso- o sjukvården

Atherosclerosis Develops Slowly, Plenty of Time for Intervention!



VIP
VÄSTERBOTTEN INTERVENTION PROGRAMME
VÄSTERBOTTENS HÄLSOUNDERSÖKNINGAR
(VHU)

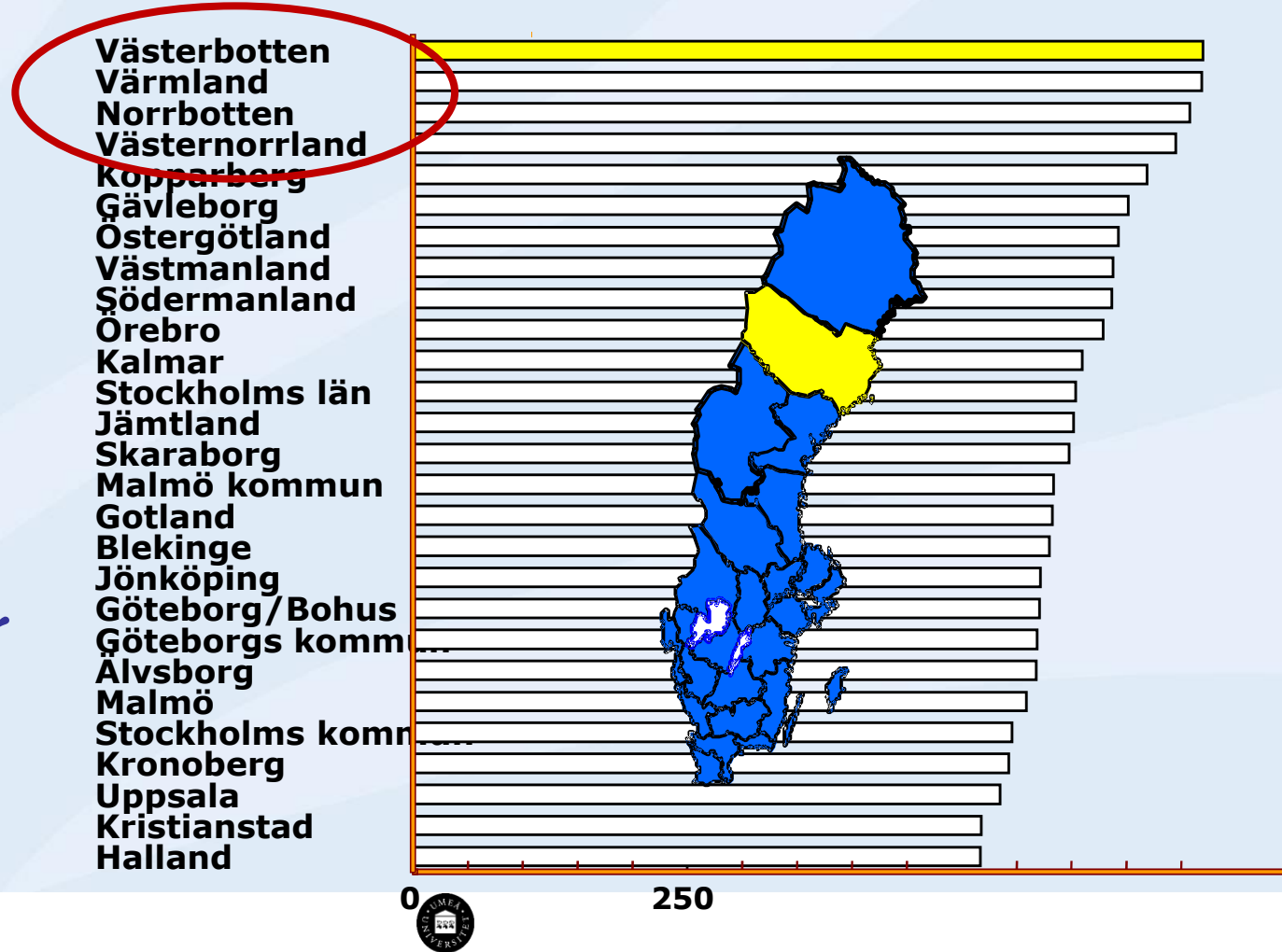


UMEÅ UNIVERSITET

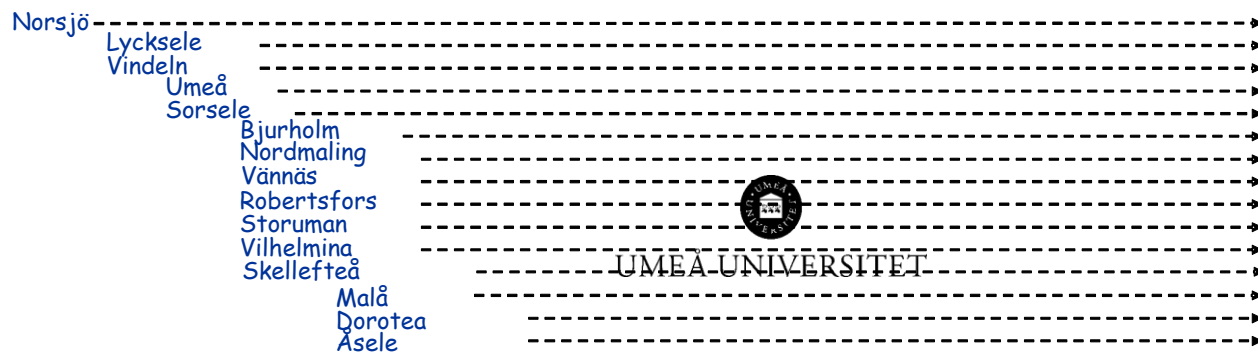
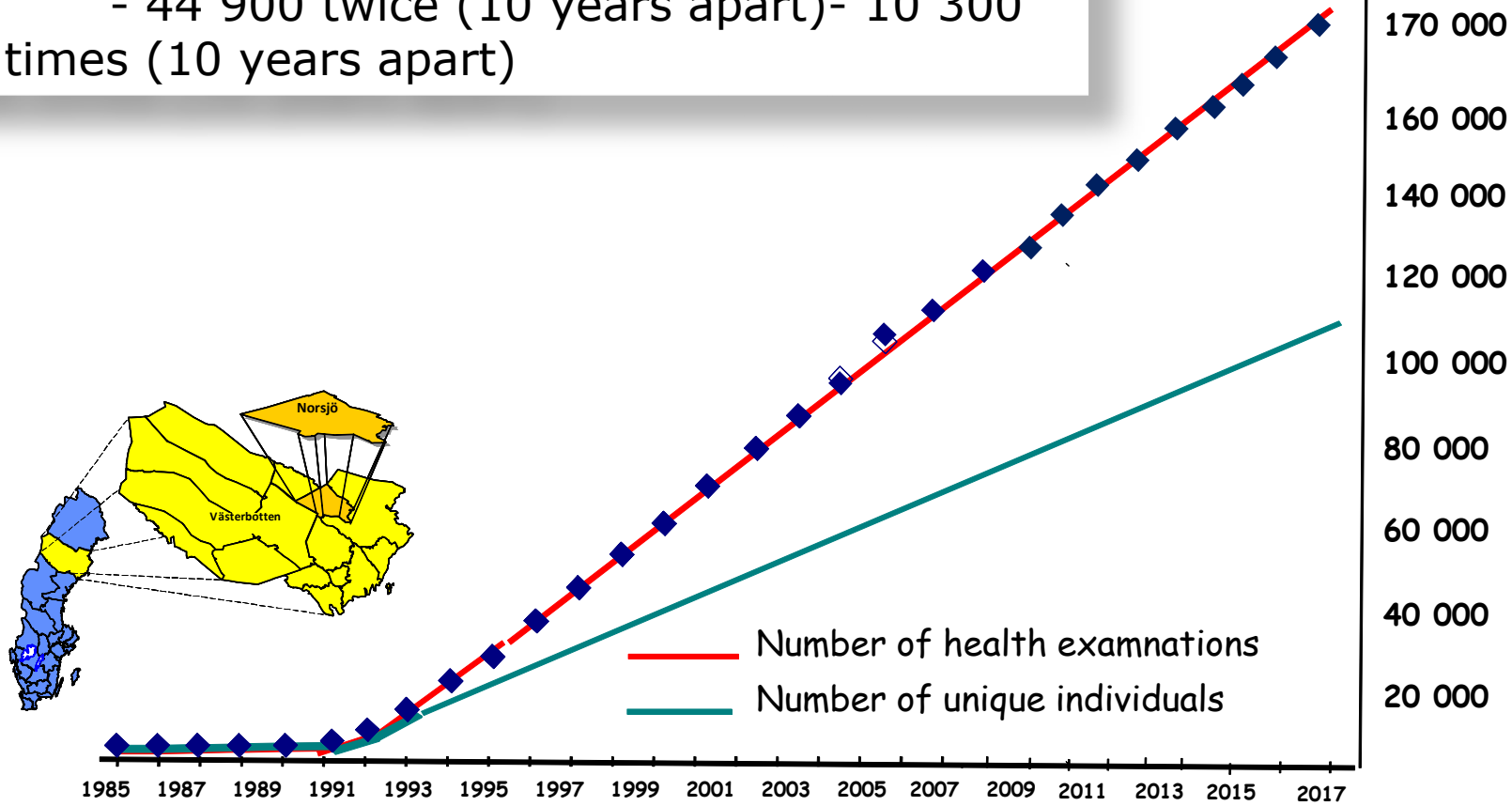
Number of deaths 15-74 years 1969-1978, in MI/year and 100.000 inhabitants

Source: Spri (The Swedish Planning and Rationalisation Institute)

*"The highest
premature
mortality in
Cardiovascular
diseases"*



173 500 health examinations (2015-12-31)
 111 780 participants:
 - 44 900 twice (10 years apart)- 10 300
 three times (10 years apart)



The health survey

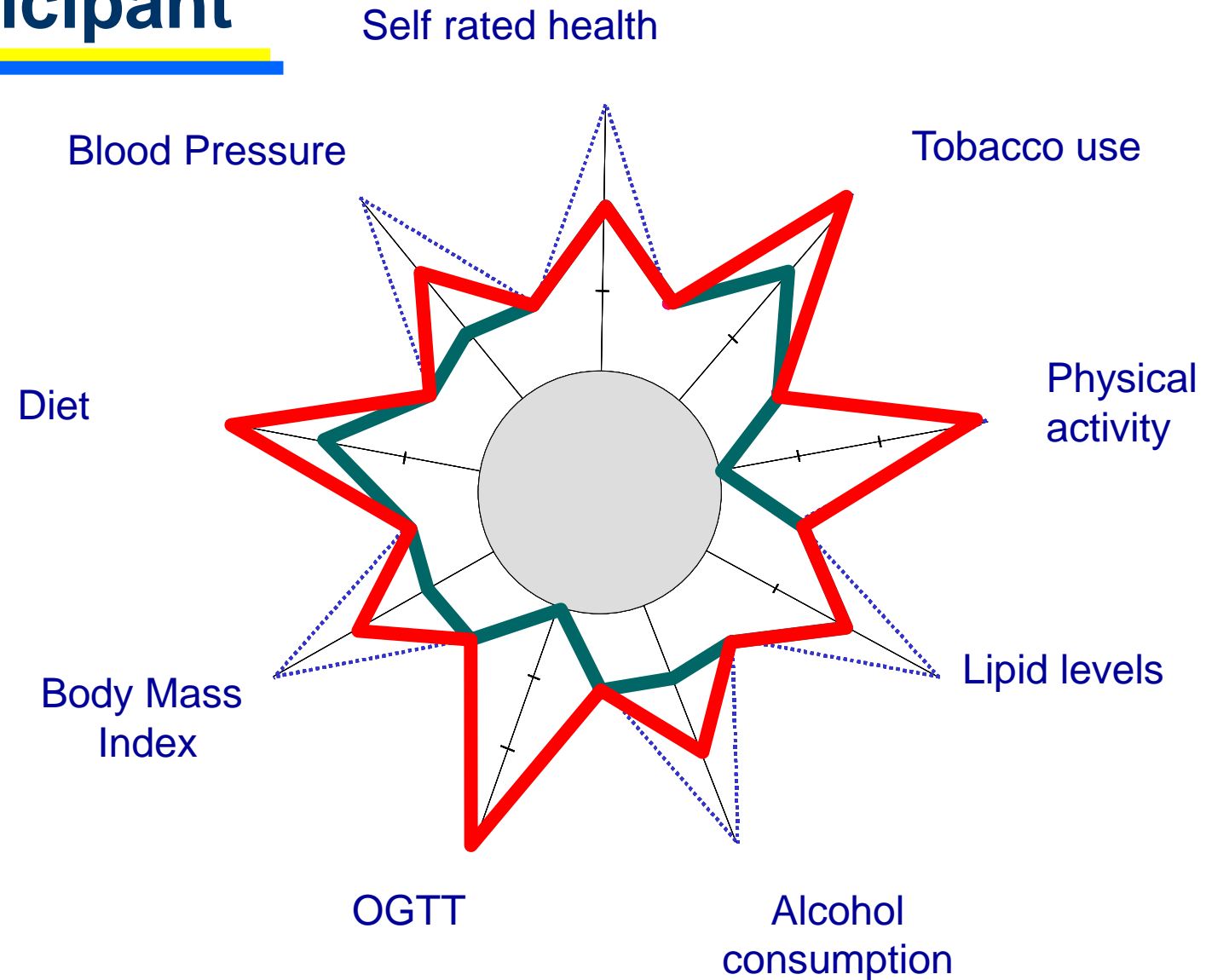
- Blood Pressure
- Lipids
- Body Mass Index, Waist/Hip Ratio
- Glucose tolerance test
- Banking of 10 blood samples/individual
- Questionnaire on socio-economical and psychosocial conditions and lifestyle

Participants:

All citizens at 40, 50 and 60 years of age



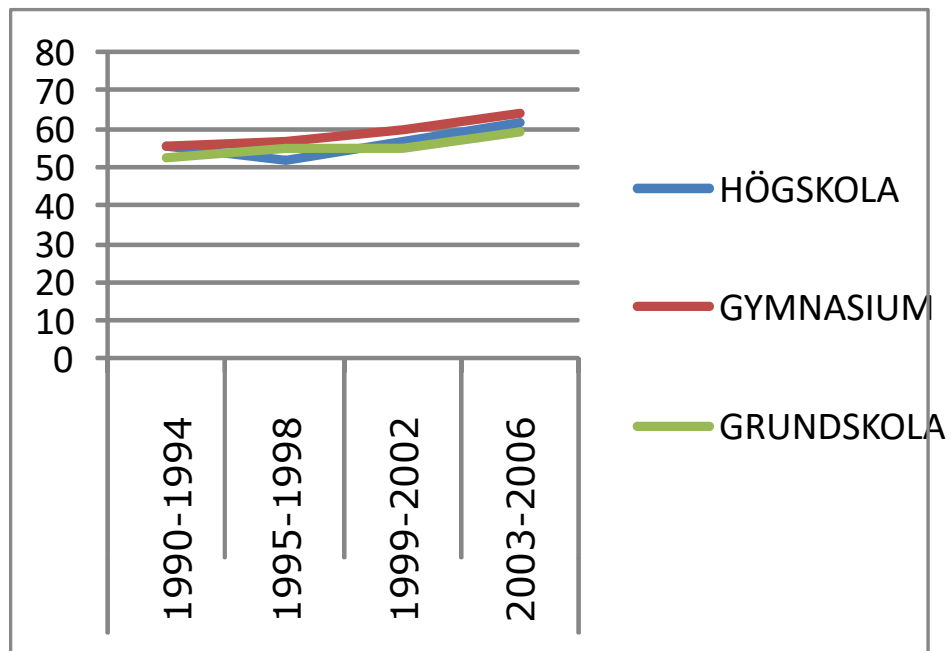
Feed back to the participant



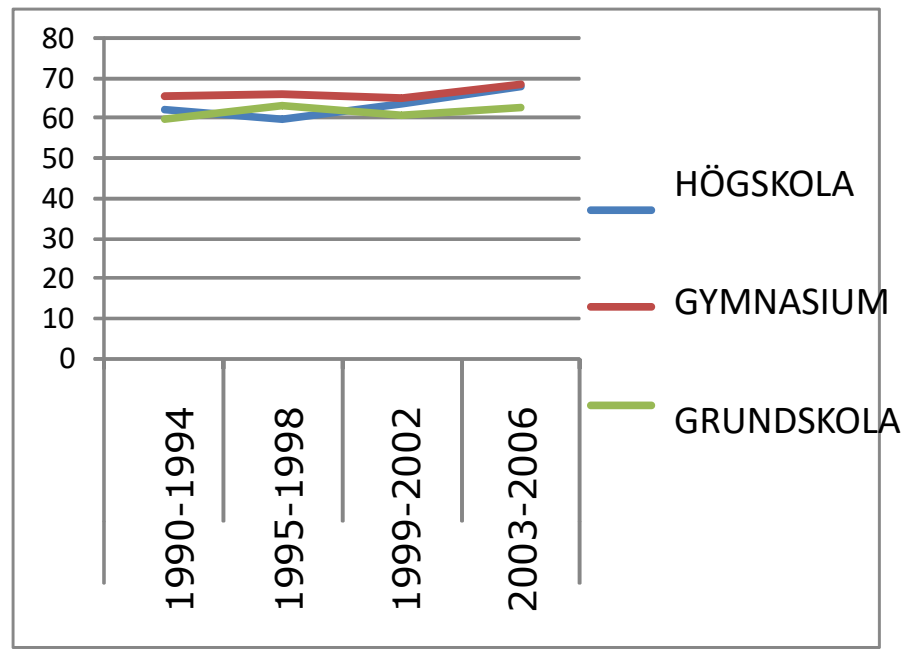
SELECTION BIAS ARE SMALL

PARTICIPATION BY EDUCATIONAL LEVEL

MEN



WOMEN



Green: ≤ 9 years in school (compulsory level)

Blue: 10-12 years

Red: ≥ 13 years (university)

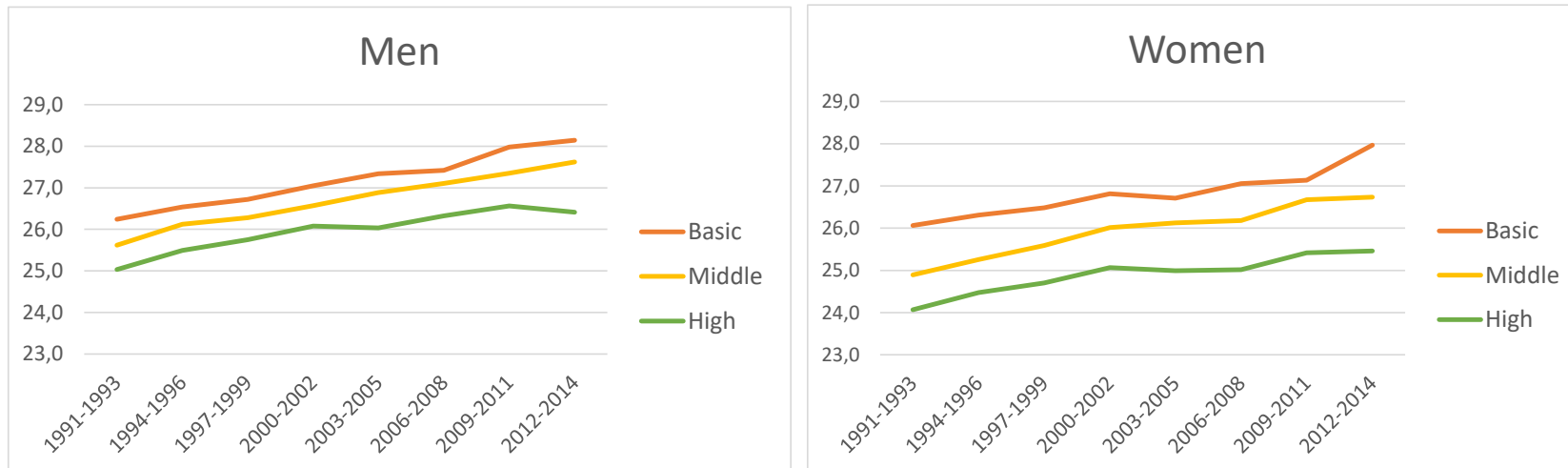


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VÄRLDENS BÄSTA
Hälsa2020

Västerbotten Intervention Programme 1991-2014

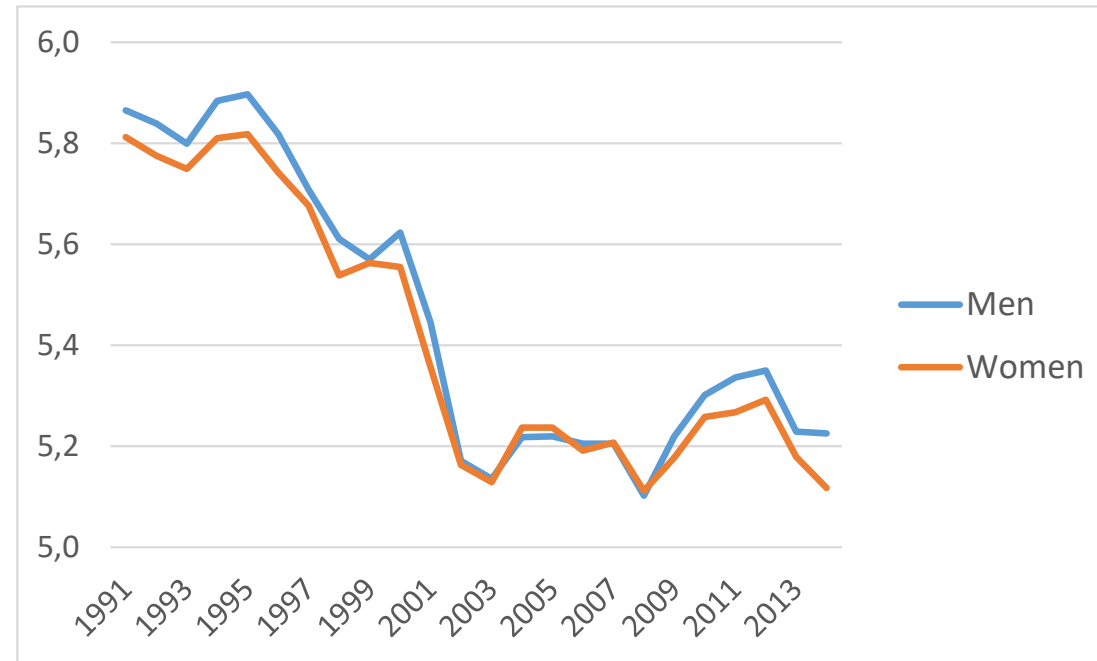
BMI by education and sex



Västerbotten Intervention Programme 1991-2014

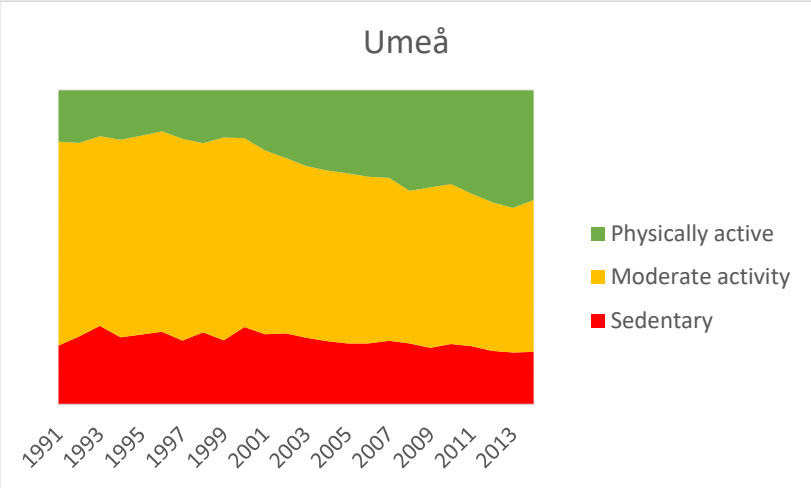
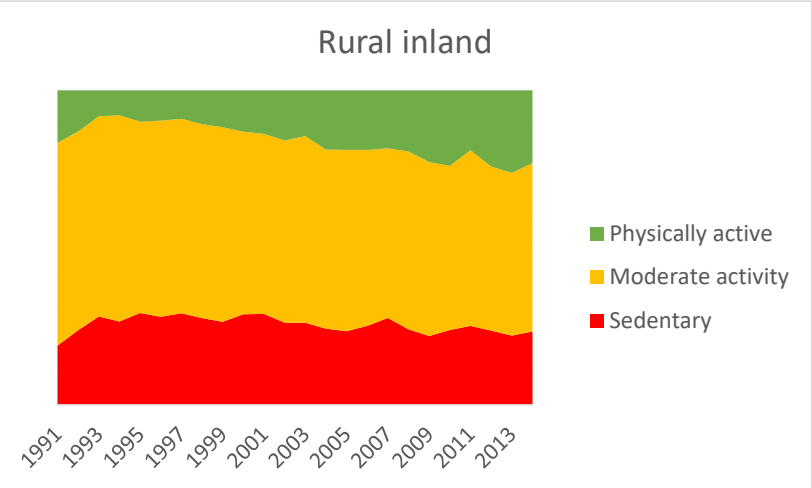
Cholesterol levels by sex, age adjusted

71,000 men and 75,000 women



Västerbotten Intervention Programme 1991-2014

Physical activity. Men



TÄNK NYTT!



08:54:32 2012-06-14

L

NUS KLINISK FYSIOLOGI

MI: 0,8

R



SIEMENS

9L4 / *CAROTID

General

2D 100%

THI / H9,00 MHz

11 dB / DR 65

ASC 7 / DTCE H

Map E / ST 2

DX ICA_

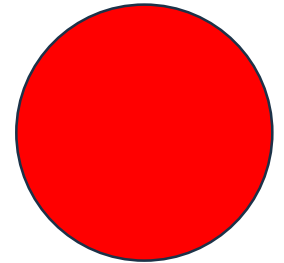
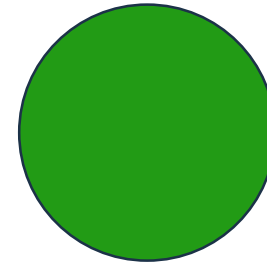
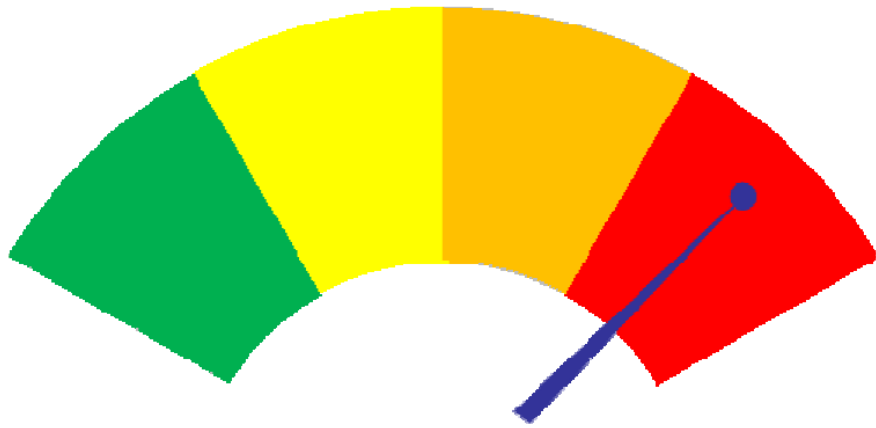
50fps

4cm

VASCULAR AGE AND PLAQUES

RISK COMMUNICATION: PICTORIAL INFORMATION

RISK ASSESSMENT: ULTRASOUND RESULTS



One picture makes more than thousand words

Hypotheses:

- Imaging of silent atherosclerosis will improve risk assessment
- The understanding of an image is superior compared to statistical risk information
- A picture works equally well for low and high educated
- The risk message need to be personalized, i.e. adapted to the individual's psychological characteristics*, preferences etc

* For example: Health literacy, self-efficacy, coping strategies, anxiety

One picture makes more than thousand words

Intervention, dual targets:

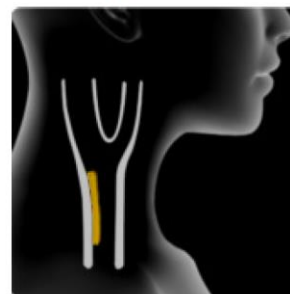
Information to the *participant* and his/her *primary care physician* about the carotid ultrasound results in the form of pictorial and graphical representations in colour of atherosclerosis

Control group: No information about ultrasound results

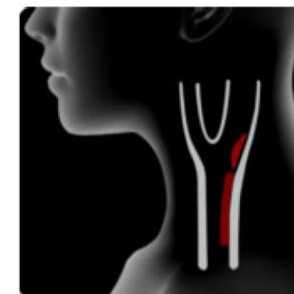


DIN BILD SOM VISAR IMT OCH PLACK

Höger sida



Vänster sida



IMT visas med en färgad linje –

GRÖN **GUL** **ORANGE** **RÖD**

Plack visas som en markering –

RÖD



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Visualization of asymptomatic atherosclerotic disease for optimum cardiovascular prevention (VIPVIZA): a pragmatic, open-label, randomised controlled trial



Ulf Näslund, Nawi Ng, Anna Lundgren, Eva Fhärm, Christer Grönlund, Helene Johansson, Bernt Lindahl, Bertil Lindahl, Kristina Lindvall, Stefan K Nilsson, Maria Nordin, Steven Nordin, Emma Nyman, Joacim Rocklöv, Davide Vanoli, Lars Weinehall, Patrik Wennberg, Per Wester, Margareta Norberg, for the VIPVIZA trial group

Lancet 2019;393:133-42

	Men (n=1670)		Women (n=1862)		Total (n=3532)	
	Control (n=862)	Intervention (n=808)	Control (n=921)	Intervention (n=941)	Control (n=1783)	Intervention (n=1749)
Framingham risk score	17.6 (9.7)	18.2 (10.6)	8.4 (5.4)	8.3 (5.3)	12.9 (9.1)	12.9 (9.6)
Low risk (<5%)	38/859 (4%)	40/805 (5%)	272/915 (30%)	266/936 (28%)	310/1774 (17%)	306/1741 (18%)
Light risk (5–9%)	154/859 (18%)	122/805 (15%)	379/915 (41%)	420/936 (45%)	533/1774 (30%)	542/1741 (31%)
Moderate risk (10–19%)	383/859 (45%)	367/805 (46%)	225/915 (25%)	211/936 (23%)	608/1774 (34%)	578/1741 (33%)
High risk (20–39%)	258/859 (30%)	243/805 (30%)	39/915 (4%)	38/936 (4%)	297/1774 (17%)	281/1741 (16%)
Very high risk (≥40%)	26/859 (3%)	33/805 (4%)	0	1/936 (<1%)	26/1774 (1%)	34/1741 (2%)
SCORE risk estimates	1.93 (1.40)	1.97 (1.38)	0.70 (0.51)	0.68 (0.49)	1.29 (1.21)	1.27 (1.19)
Low risk (<1%)	239/860 (28%)	197/805 (24%)	741/918 (81%)	762/937 (81%)	980/1778 (55%)	959/1742 (55%)
Moderate risk (1–4%)	596/860 (69%)	579/805 (72%)	177/918 (19%)	175/937 (19%)	773/1778 (43%)	754/1742 (43%)
High risk (5–9%)	23/860 (3%)	28/805 (3%)	0	0	23/1778 (1%)	28/1742 (2%)
Very high risk (≥10%)	2/860 (<1%)	1/805 (<1%)	0	0	2/1778 (<1%)	1/1742 (<1%)
Carotid plaques (left or right)	442/862 (51%)	406/808 (50%)	370/921 (40%)	361/939 (38%)	812/1783 (46%)	767/1747 (44%)
Carotid intima media wall thickness, mm*	0.77 (0.17)	0.77 (0.16)	0.71 (0.14)	0.71 (0.14)	0.74 (0.16)	0.74 (0.15)
Intima media thickness as vascular age†						
Quartile 1 (green)	97/862 (11%)	86/808 (11%)	56/921 (6%)	53/941 (6%)	153/1783 (9%)	139/1749 (8%)
Quartile 2 (yellow)	152/862 (18%)	150/808 (19%)	186/921 (20%)	183/941 (19%)	338/1783 (19%)	333/1749 (19%)
Quartile 3 (orange)	236/862 (27%)	212/808 (26%)	281/921 (31%)	313/941 (33%)	517/1783 (29%)	525/1749 (30%)
Quartile 4 (red)	377/862 (44%)	360/808 (45%)	398/921 (43%)	392/941 (42%)	775/1783 (43%)	752/1749 (43%)
Age group						
40 years	73/862 (8%)	61/808 (8%)	69/921 (7%)	73/941 (8%)	142/1783 (8%)	134/1749 (8%)
50 years	248/862 (29%)	226/808 (28%)	244/921 (26%)	260/941 (28%)	492/1783 (28%)	486/1749 (28%)
60 years	541/862 (63%)	521/808 (64%)	608/921 (66%)	608/941 (65%)	1149/1783 (64%)	1129/1749 (65%)
Sex						
Men	862/1670 (52%)	808/1670 (48%)	NA	NA	862/1783 (48%)	808/1749 (46%)
Women	NA	NA	921/1862 (49%)	941/1862 (51%)	921/1783 (52%)	941/1749 (54%)
Education‡§						
Basic to mid-level	611/857 (71%)	581/802 (72%)	526/905 (58%)	562/933 (60%)	1137/1762 (65%)	1143/1735 (66%)
High	246/857 (29%)	221/802 (28%)	379/905 (42%)	371/933 (40%)	625/1762 (35%)	592/1735 (34%)
Waist circumference, cm	101.2 (11.3)	101.2 (11.7)	92.7 (13.6)	91.9 (12.8)	96.8 (13.2)	96.2 (13.1)
Abdominal obesity (≥102 cm waist circumference for men, ≥88 cm waist circumference for women)	378/851 (44%)	353/803 (44%)	566/899 (63%)	554/929 (60%)	944/1750 (54%)	907/1752 (52%)

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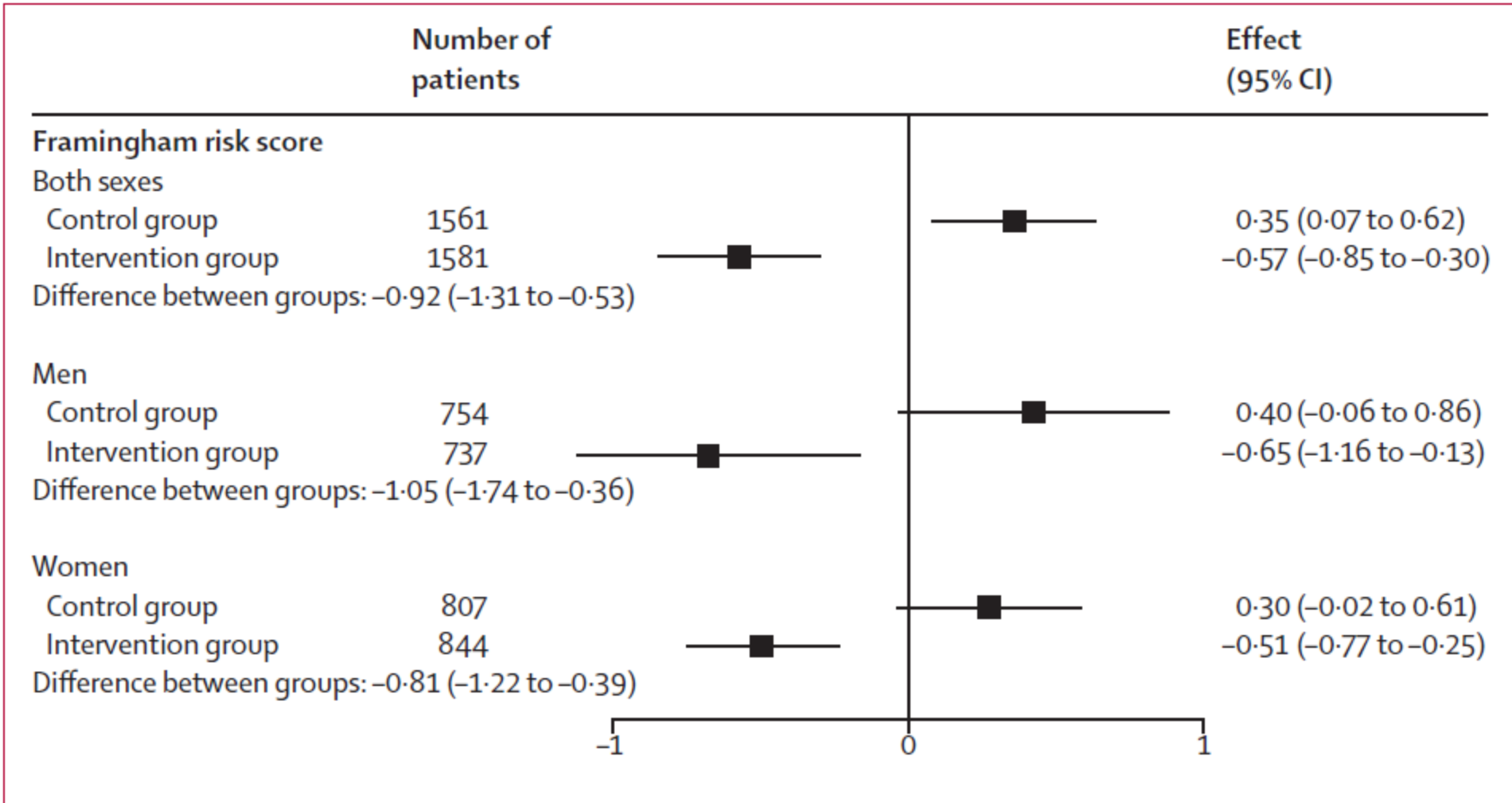
	Men (n=1670)		Women (n=1862)		Total (n=3532)	
	Control (n=862)	Intervention (n=808)	Control (n=921)	Intervention (n=941)	Control (n=1783)	Intervention (n=1749)
(Continued from previous page)						
Fasting glucose, mmol/L	5.53 (1.52)	5.45 (1.37)	5.34 (1.08)	5.30 (1.06)	5.44 (1.31)	5.37 (1.21)
Diabetes¶	48/861 (6%)	61/808 (8%)	44/918 (5%)	33/940 (4%)	92/1779 (5%)	94/1748 (5%)
Blood pressure						
Systolic blood pressure, mm Hg	131.9 (15.2)	132.3 (16.5)	126.8 (16.1)	127.2 (16.3)	129.3 (15.9)	129.6 (16.6)
Diastolic blood pressure, mm Hg	84.6 (10.3)	85.0 (10.9)	80.9 (9.8)	80.8 (10.1)	82.7 (10.2)	82.8 (10.7)
Use of antihypertensives‡	262/862 (30%)	267/808 (33%)	259/921 (28%)	268/941 (28%)	521/1783 (29%)	535/1749 (31%)
Hypertension	483/862 (56%)	478/806 (59%)	427/917 (47%)	440/938 (47%)	910/1779 (51%)	918/1744 (53%)
Plasma lipids						
Total cholesterol, mmol/L	5.51 (1.11)	5.51 (1.13)	5.70 (1.04)	5.69 (1.04)	5.61 (1.08)	5.61 (1.08)
HDL cholesterol, mmol/L	1.23 (0.34)	1.25 (0.38)	1.54 (0.44)	1.51 (0.42)	1.39 (0.42)	1.39 (0.42)
LDL cholesterol, mmol/L	3.56 (1.00)	3.55 (0.99)	3.55 (0.94)	3.58 (0.95)	3.55 (0.97)	3.57 (0.96)
Triglycerides, mmol/L	1.66 (1.12)	1.66 (1.13)	1.34 (0.75)	1.33 (0.74)	1.50 (0.96)	1.48 (0.95)
Use of lipid-lowering medication‡	118/862 (14%)	118/808 (15%)	73/921 (8%)	81/941 (9%)	191/1783 (11%)	199/1749 (11%)
Dyslipidaemia**	799/861 (93%)	751/803 (94%)	862/920 (94%)	862/939 (92%)	1661/1781 (93%)	1613/1742 (93%)

(Table continues on next page)

	Men (n=1670)		Women (n=1862)		Total (n=3532)	
	Control (n=862)	Intervention (n=808)	Control (n=921)	Intervention (n=941)	Control (n=1783)	Intervention (n=1749)
(Continued from previous page)						
Family history of cardiovascular disease or diabetes	402/834 (48%)	341/760 (45%)	468/890 (53%)	510/901 (57%)	870/1724 (50%)	851/1661 (51%)
Smoking daily or occasionally	111/860 (13%)	92/807 (11%)	128/918 (14%)	115/939 (12%)	239/1778 (13%)	207/1746 (12%)

Data are mean (SD) or n/N (%). NA=not applicable. VIPVIZA=visualization of asymptomatic atherosclerotic disease for optimum cardiovascular prevention. SCORE=systematic coronary risk evaluation.*Maximum mean value independent of side and angle. †Vascular age in comparison with individuals of same age and sex in a reference population (Atherosclerosis Risk In Communities study population). Quartile 1 is comparable to being 10 years younger, quartile 2 is comparable to being 5 years younger, quartile 3 is comparable to being 5 years older, and quartile 4 is comparable to being 10 years older. ‡Self-reported. §Basic to mid-level of education is defined as compulsory 9 years of schooling or senior high school (≤12 years). High level of education is defined as 13 years or more of schooling. ¶Self-reported known diabetes or fasting glucose ≥7.0 mmol/L. ||Self-reported use of antihypertensive medication or systolic blood pressure ≥140 mm Hg or diastolic blood pressure ≥90 mm Hg. **Self-reported use of lipid-lowering medication or serum cholesterol ≥5 mmol/L or serum LDL cholesterol ≥2.5 mmol/L.

Table: Baseline characteristics of the VIPVIZA study population



SCORE

Both sexes

Control group 1563

Intervention group 1584

Difference between groups: -0.13 (-0.19 to -0.08)

Men

Control group 751

Intervention group 740

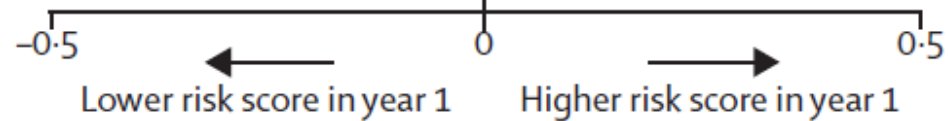
Difference between groups: -0.19 (-0.30 to -0.08)

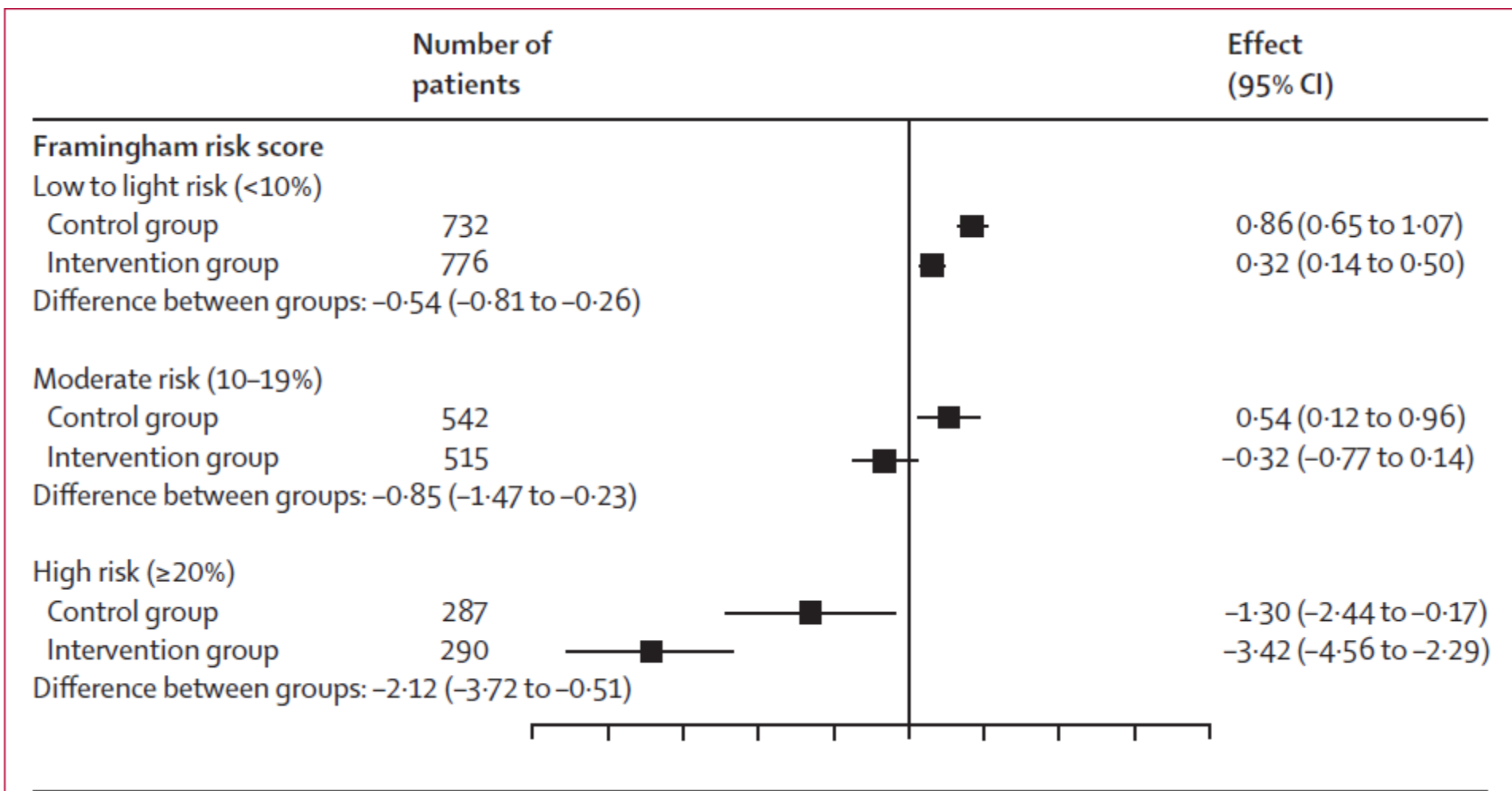
Women

Control group 812

Intervention group 844

Difference between groups: -0.07 (-0.11 to -0.04)





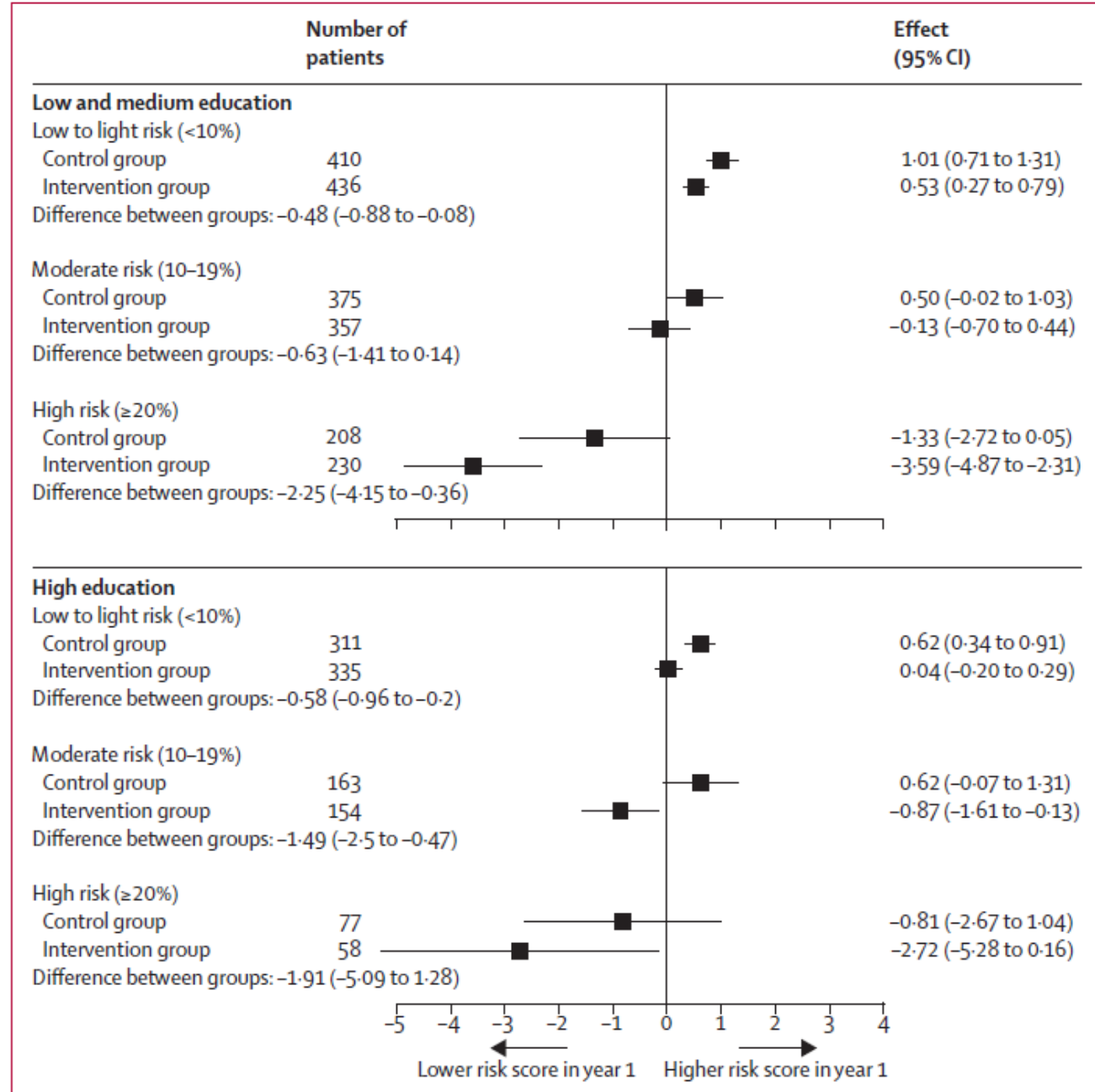


Figure 5: Changes in Framingham risk score by baseline risk categories in the intervention and control group between baseline and 1-year follow-up stratified by education level

Difference between groups is given with 95% CI.

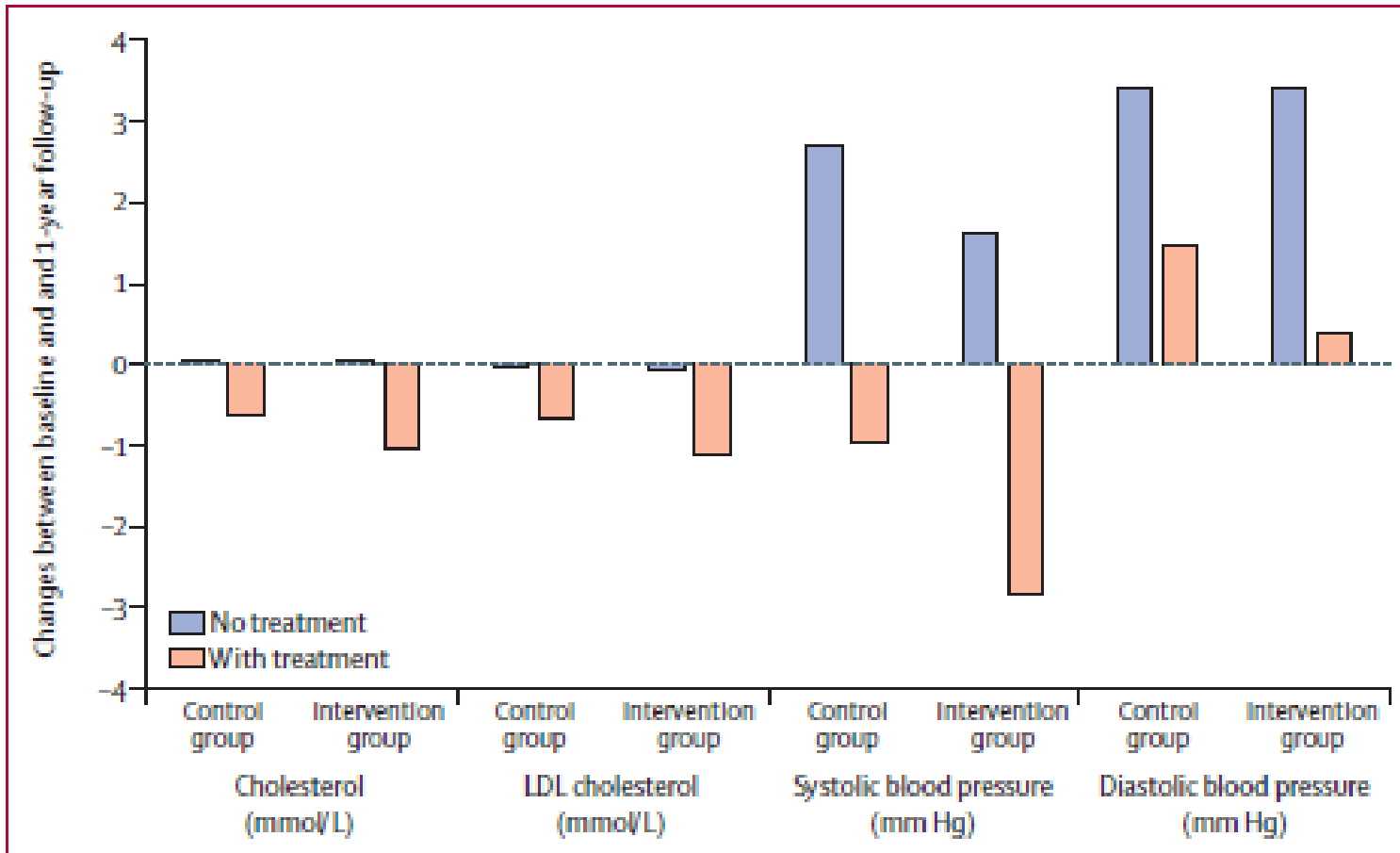
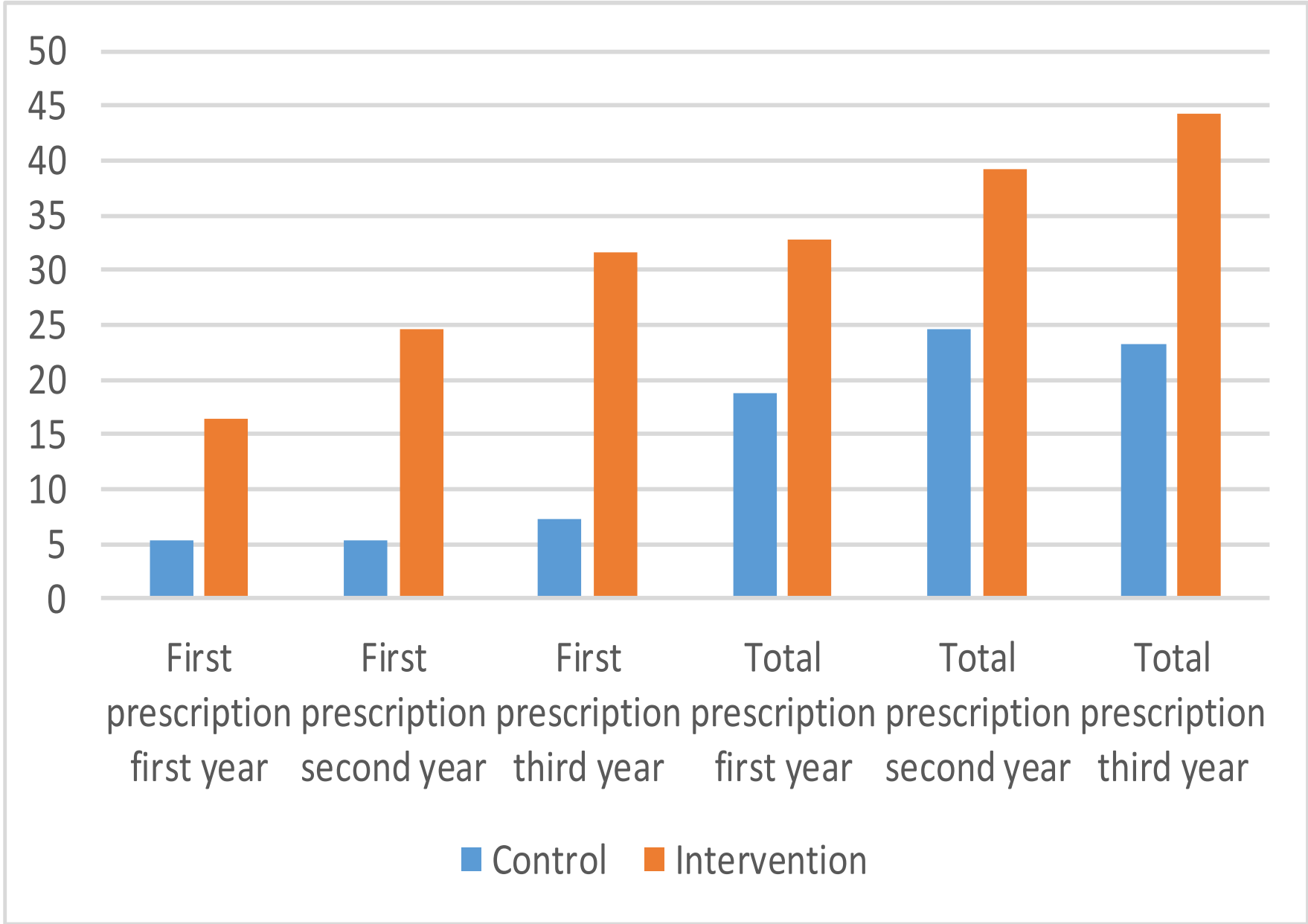


Figure 6: Absolute changes in the level of cholesterol, LDL cholesterol, and systolic and diastolic blood pressure between baseline and 1-year follow-up based on statin or antihypertensive treatment, stratified by treatment group



Conclusion, interpretation 1 y FU

VIPVIZA provides evidence for the contributing role of pictorial information about silent atherosclerosis for prevention of CVD



Conclusion 1 y FU

Effects independent of level of education or sex

Higher calculated CVD risk –
more effect on risk scores

HEALTH LITERACY AND CAROTID ARTERY PLAQUES

Low health literacy was independently associated with presence of ultrasound-detected carotid artery plaques after adjustment for age and education, OR (95% CI) 1.54 (1.28-1.85), demonstrating a similar level of risk as for smoking.

Lindahl B et al. Eur J Prev Card (Oct 2019)

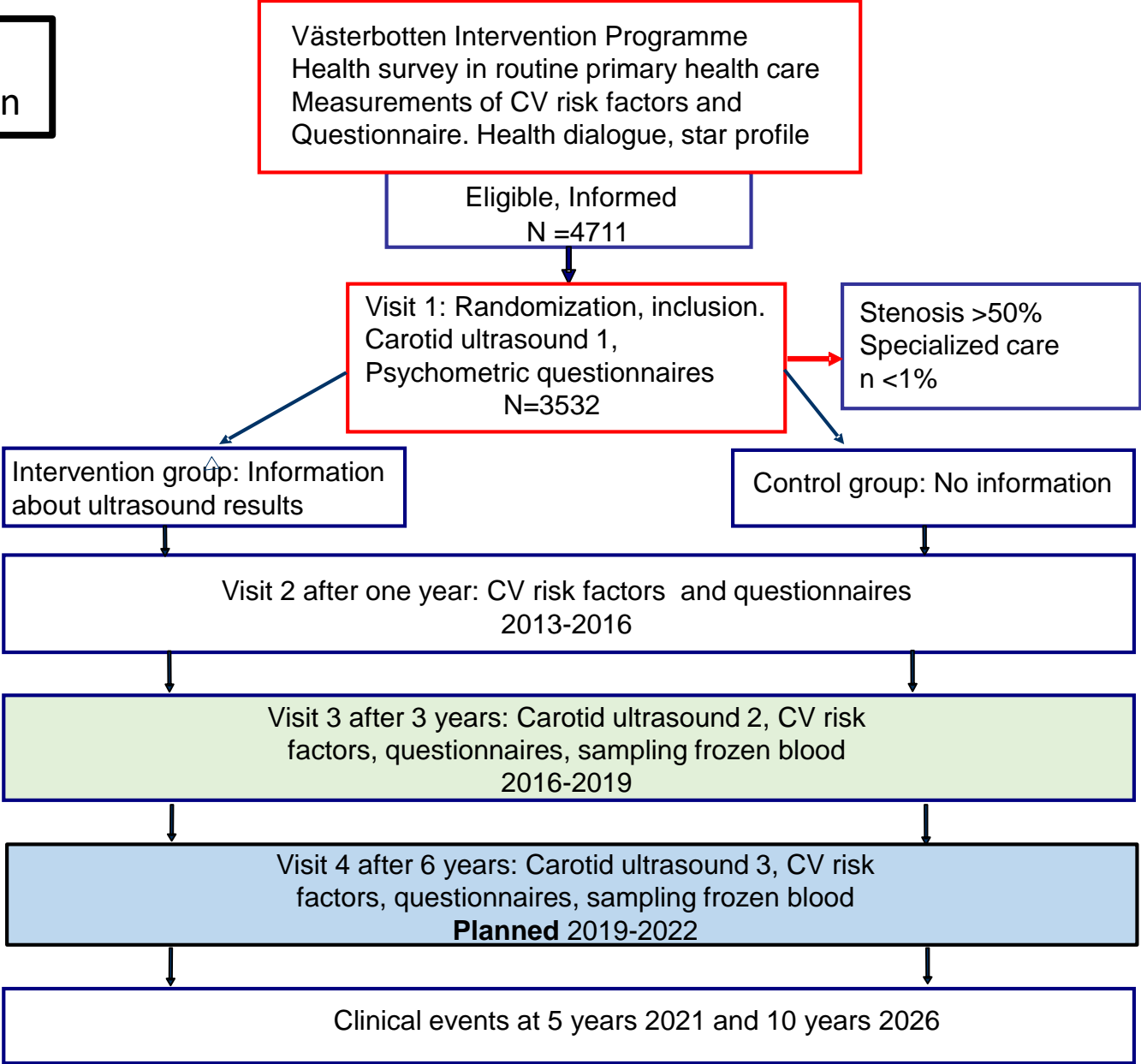
HEALTH LITERACY AND CARDIOVASCULAR RISK

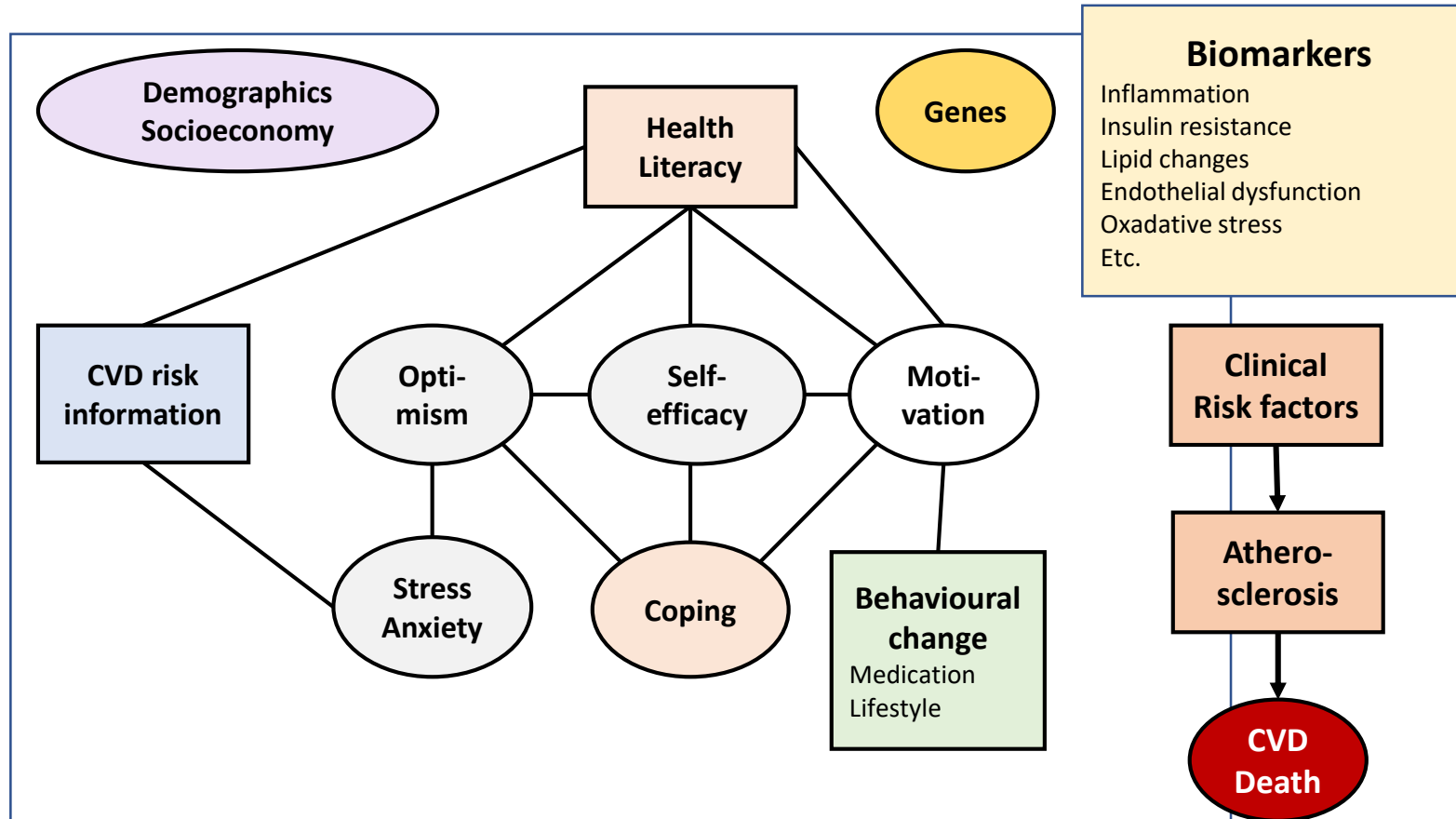
In a linear regression model low health literacy, after adjustment for education, was associated with an increase in FRS of 2.33, (95% CI) 1.54-3.11, $p < 0.001$, and an increase in SCORE of 0.28, (95% CI) 0.18-0.38, $p < 0.001$.

FRS – Framingham Risk Score

Lindahl B et al. Eur J Prev Card (Oct 2019)

Extension with 6-year follow-up data collection









Tack!