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# Economics - questions, methods, data and the aim for results

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KATARINA STEEN CARLSSON, INST KLINISKA VETENSKAPER, MALMÖ

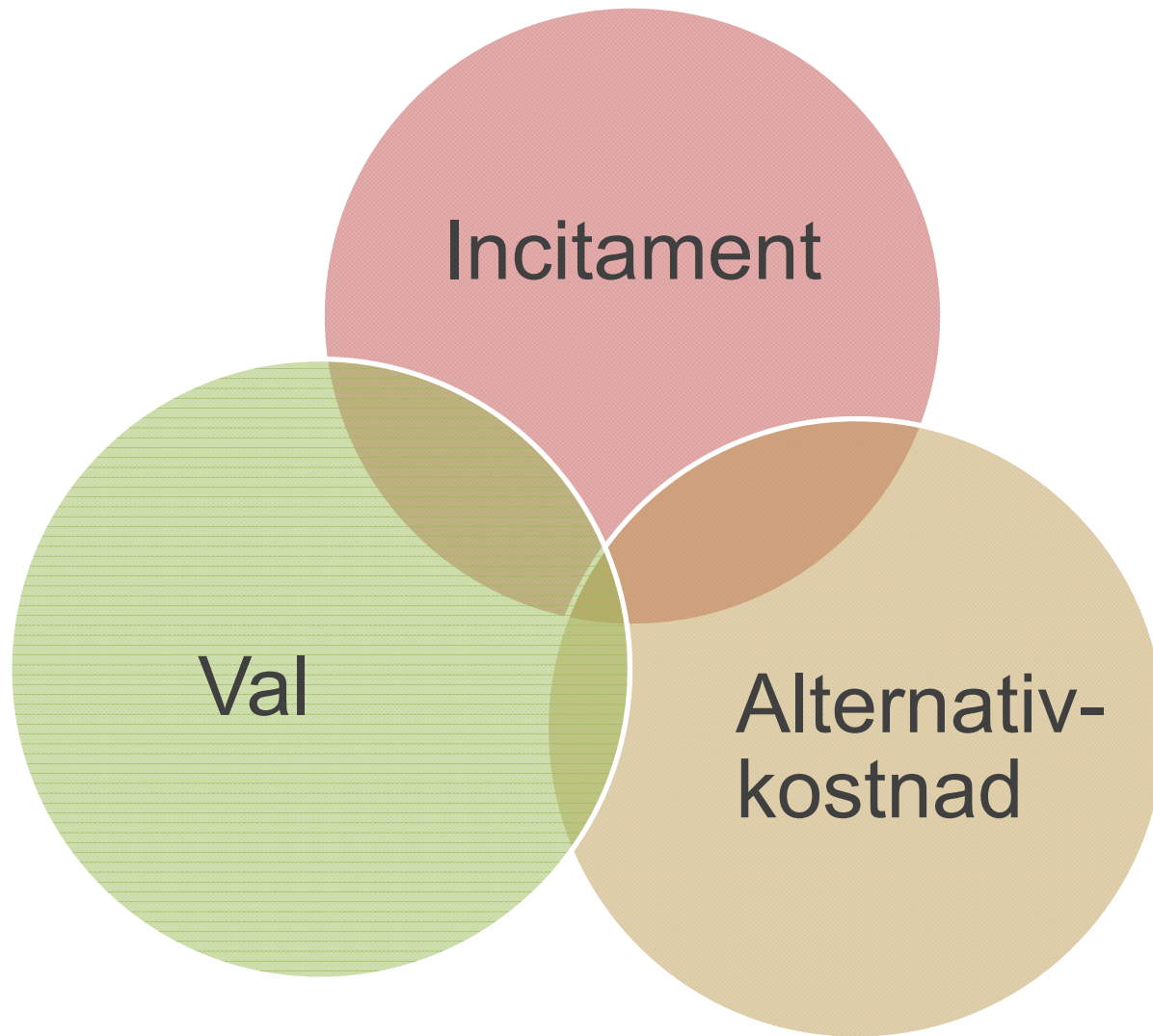


*Uncertainty and the Welfare Economics of Medical Care*  
Kenneth J. Arrow, *American Economic Review* 1963

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”The special economic problems of medical care can be explained as adaptations to the existence of uncertainty in the incidence of disease and in the efficacy of treatment” (p. 941)

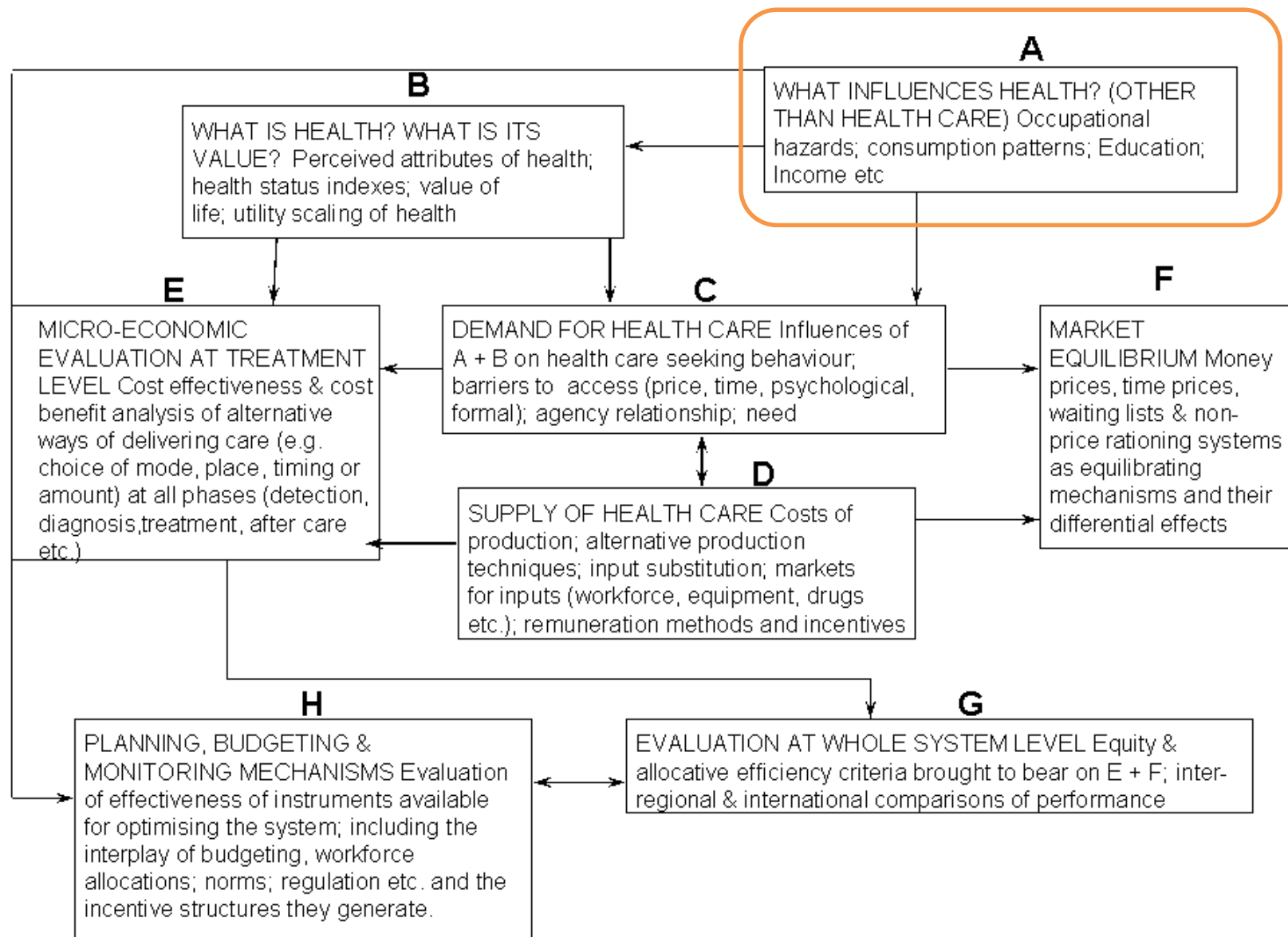




Incitament

Val

Alternativ-  
kostnad



Alan Williams kopplingschema från 1987

# A

WHAT INFLUENCES HEALTH? (OTHER THAN HEALTH CARE) Occupational hazards; consumption patterns; Education; Income etc

- Nationella register hos Statistiska centralbyrån
  - Longitudinell integrationsdatabas för Sjukförsäkrings- och Arbetsmarknadsstudier (LISA)
  - Flergenerationsregistret
- Kvalitetsregister
  - Hälsodata
  - Demografiska data

## Parental Education and Offspring Outcomes: Evidence from the Swedish Compulsory School Reform<sup>†</sup>

By PETTER LUNDBORG, ANTON NILSSON, AND DAN-OLOF ROTH\*

- Pliktverkets mönstringsdata för män födda 1955-1979
  - Global hälsa, längd, fysisk prestation, blodtryck, fetma
  - Kognitiv förmåga
- Statistiska centralbyrån
  - Flergenerationsregistret
- Grundskolereformen => Föräldrars utbildning ↑



TABLE 4—IV RESULTS

	Global health (1)	Height (2)	Physical capacity (3)	Obesity (4)	Hypertension (5)	Cognitive ability (6)	Non- cognitive ability (7)
<i>Panel A. Only controlling for birth year and municipality fixed effects</i>							
Mother's schooling	0.083* (0.048)	0.047 (0.040)	0.167** (0.068)	-0.007 (0.007)	0.096** (0.044)	0.089** (0.044)	-0.014 (0.050)
Father's schooling	0.002 (0.047)	-0.025 (0.045)	0.143* (0.077)	-0.005 (0.007)	0.058* (0.033)	-0.022 (0.052)	-0.051 (0.056)
<i>Panel B. Controlling for birth year fixed effects and municipality fixed effects, and interactions between birth year and county of residence</i>							
Mother's schooling	0.139*** (0.051)	0.080* (0.045)	0.055 (0.043)	-0.010 (0.007)	-0.002 (0.018)	0.106** (0.042)	0.048 (0.047)
Father's schooling	0.008 (0.044)	-0.034 (0.044)	0.058 (0.048)	-0.001 (0.006)	0.026 (0.016)	0.001 (0.044)	0.016 (0.047)
<i>Panel C. Controlling for birth year fixed effects and municipality fixed effects, and municipality-specific trends</i>							
Mother's schooling	0.103** (0.046)	0.089** (0.042)	0.023 (0.044)	-0.007 (0.007)	0.023 (0.018)	0.106*** (0.038)	0.076* (0.045)
Father's schooling	0.025 (0.041)	-0.055 (0.037)	0.048 (0.043)	-0.002 (0.006)	0.018 (0.014)	-0.037 (0.042)	0.032 (0.043)
Mothers	404,381	389,626	364,954	389,604	384,039	391,399	372,768
Fathers	325,413	313,008	288,799	312,998	307,951	314,339	297,904



## Parental Education and Offspring Outcomes: Evidence from the Swedish Compulsory School Reform<sup>†</sup>

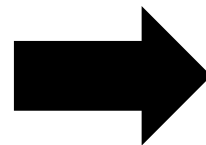
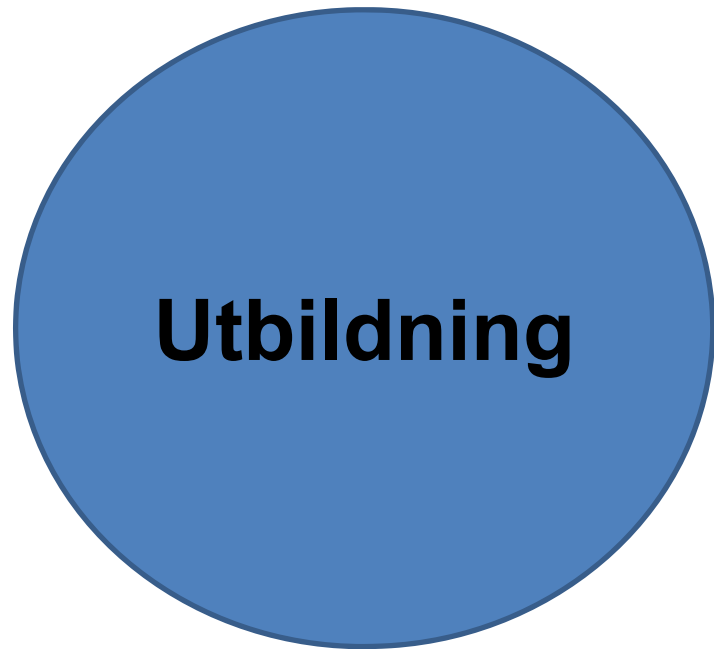
By PETTER LUNDBORG, ANTON NILSSON, AND DAN-OLOF ROTH\*

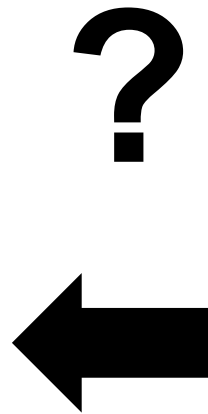
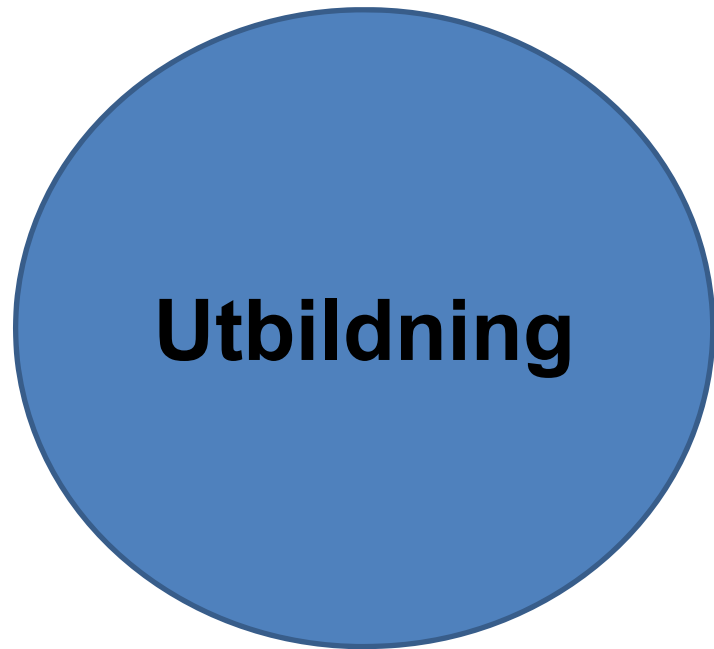
### Författarnas slutsatser

- Mödrars utbildning förbättrar söners hälsa
  - Global hälsa, längd
  - Kognitiv och icke-kognitiv förmåga
- Fäders utbildning ej signifikant









# Impact of childhood-onset type 1 diabetes on schooling: a population-based register study

S. Persson • G. Dahlquist • U.-G. Gerdtham • K. Steen Carlsson

- Svenska barndiabetesregistret, personer födda 1972-1978
  - Fyra befolkningskontroller (födelseår, bostadskommun)
- Statistiska centralbyrån
  - Flergenerationsregistret, LISA
- [Socialstyrelsen]
  - Patientregistret, Läkemedelsregistret



# Effekten av typ 1 diabetes på slutbetygets medelvärde i grundskolan och gymnasieskolan (Persson et al, Diabetologia 2013)

	$\beta \pm SE$	95% CI	p value
<b>Compulsory school</b>			
Model 1: unadjusted effect of diabetes (n = 11,955)	-0.09 ± 0.02	-0.12, -0.54	<0.001
Model 2: effect of diabetes after controlling for confounders (n = 11,236)	-0.07 ± 0.02	-0.10, -0.04	<0.001
Model 3: effect of age at diagnosis of diabetes after controlling for confounders (n = 11,236)			
Controls (reference group)			
Onset of diabetes at 0–4 years	-0.15 ± 0.05	-0.24, -0.06	0.001
Onset of diabetes at 5–9 years	-0.07 ± 0.02	-0.12, -0.03	0.001
Onset of diabetes at 10–15 years	-0.06 ± 0.02	-0.10, -0.02	0.003
<b>Upper secondary school—theoretical programmes</b>			
Model 1: unadjusted effect of diabetes (n = 4,078)	-0.06 ± 0.03	-0.11, -0.01	0.029
Model 2: effect of diabetes after controlling for confounders (n = 3,840)	-0.07 ± 0.02	-0.11, -0.03	0.001
Model 3: effect of age at diagnosis of diabetes after controlling for confounders (n = 3,840)			
Controls (reference group)			
Onset of diabetes at 0–4 years	-0.11 ± 0.05	-0.20, -0.01	0.025
Onset of diabetes at 5–9 years	-0.11 ± 0.03	-0.17, -0.05	<0.001
Onset of diabetes at 10–15 years	-0.03 ± 0.03	-0.08, 0.02	0.236
<b>Upper secondary school—vocational programme</b>			
Model 1: unadjusted effect of diabetes (n = 4,369)	-0.05 ± 0.02	-0.09, -0.00	0.031
Model 2: effect of diabetes after controlling for confounders (n = 4,098)	-0.02 ± 0.02	-0.06, 0.01	0.181
Model 3: effect of age at diagnosis of diabetes after controlling for confounders (n = 4,098)			
Controls (reference group)			
Onset of diabetes at 0–4 years	-0.03 ± 0.06	-0.14, 0.08	0.644
Onset of diabetes at 5–9 years	0.01 ± 0.02	-0.04, 0.05	0.833
Onset of diabetes at 10–15 years	-0.04 ± 0.02	-0.09, 0.00	0.066

# Impact of childhood-onset type 1 diabetes on schooling: a population-based register study

S. Persson • G. Dahlquist • U.-G. Gerdtham • K. Steen Carlsson

## Slutsats

Insjuknande i typ 1-diabetes tycks ha en negativ effekt på

- medelbetyg i grundskolan
- sannolikheten att ha gymnasiebetyg
- medelbetyg på gymnasiers teoretiska program

Pågående studie av samma kohort analyserar konsekvenser för högskoleutbildning och förvärvsinkomst



## **Type 1 diabetes with early onset and educational field at upper secondary and university level:**

### **Is own experience an asset for a health care career?**

STEEN CARLSSON K; LOVÉN I for the Swedish Childhood Diabetes Register Study Group  
Poster #854 at the EASD 2015, Stockholm

Skiljer sig utbildningsvägarna för personer som insjuknar typ 1 diabetes före 15 års ålder från matchade befolkningskontroller?

- Svenska barndiabetesregistret, personer födda 1962-1975
  - Typ 1 diabetes n=2,756
  - Fyra befolkningskontroller (födelseår, bostadskommun; n=11,020)
- Statistiska centralbyrån
  - Flergenerationsregistret, LISA

## Type 1 diabetes with early onset and educational field at upper secondary and university level:

### Is own experience an asset for a health care career?

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## CLASSIFICATION OF EDUCATION

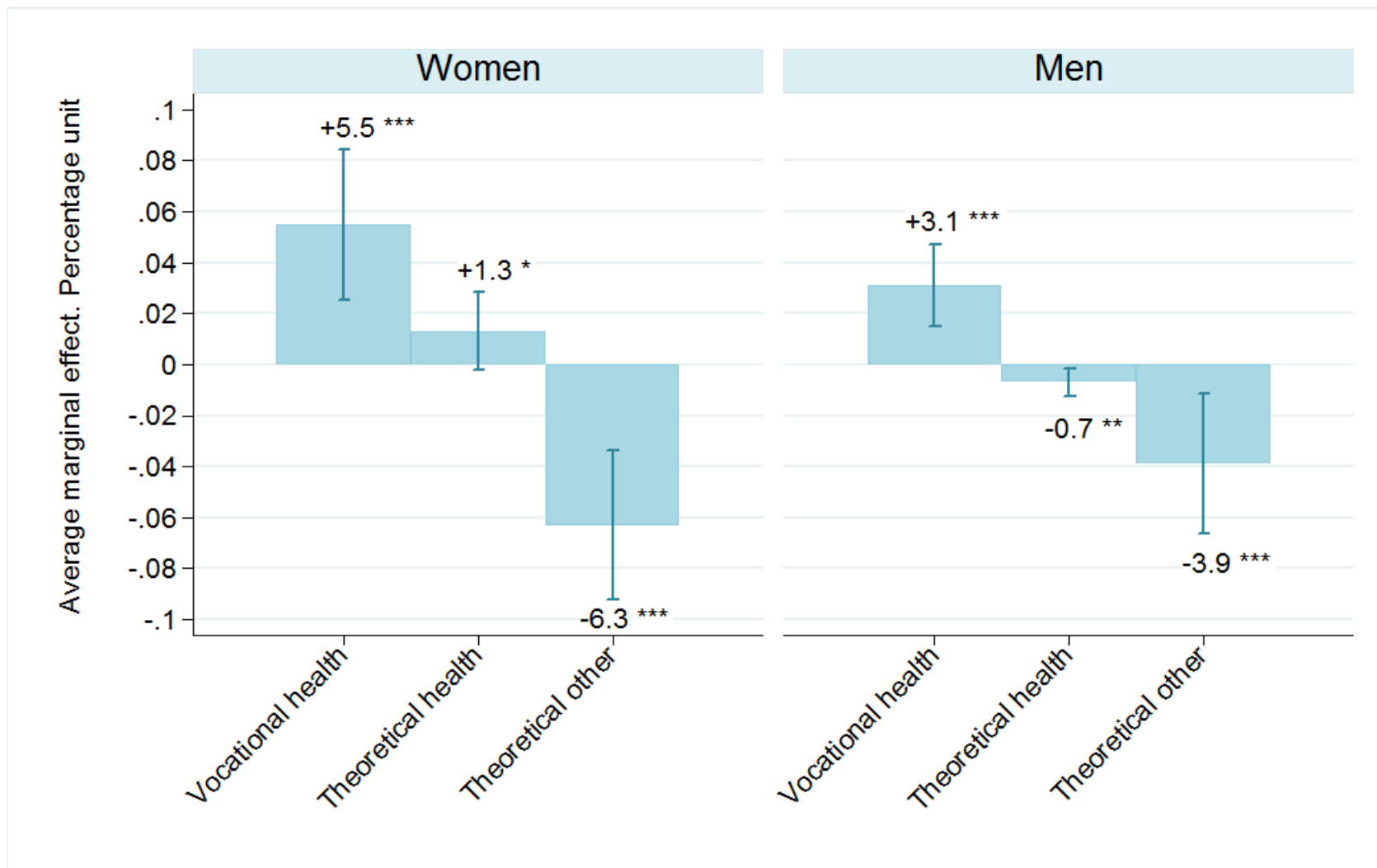
Table 1 Educational orientation – Examples of educational programmes.

Upper secondary (age 16-19 years)	
<b>Health oriented*</b>	<i>Vocational:</i> Health and Social Care, Child and Recreation <i>Theoretical:</i> Natural Sciences†
<b>Other</b>	<i>Vocational:</i> Natural Resource Use, Business and Administration, Building and Construction, Hotel and Tourism, Vehicle and Transport, etc <i>Theoretical:</i> Natural Sciences‡, Social Sciences, Technology, etc
University (age 19+ years)	
<b>Health oriented*</b>	Physician, Nurse, Physiotherapist, Occupational Therapist, Pharmacist, Dentist, Biomedical Scientist, etc
<b>Other</b>	Engineering, Economics, Law, Teaching, Services, etc

Note: \*SUN code 8 Health, medical and social care. † If university education health oriented. ‡ If university education *not* health oriented



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Average marginal effect measured as percentage unit difference in the probability of an orientation in **upper secondary school**. By multinomial logit estimation controlling for year of birth, not born in Nordic country, parental characteristics (non-Nordic background, education, mother’s age at child-birth)





## **Type 1 diabetes with early onset and educational field at upper secondary and university level:**

### **Is own experience an asset for a health care career?**

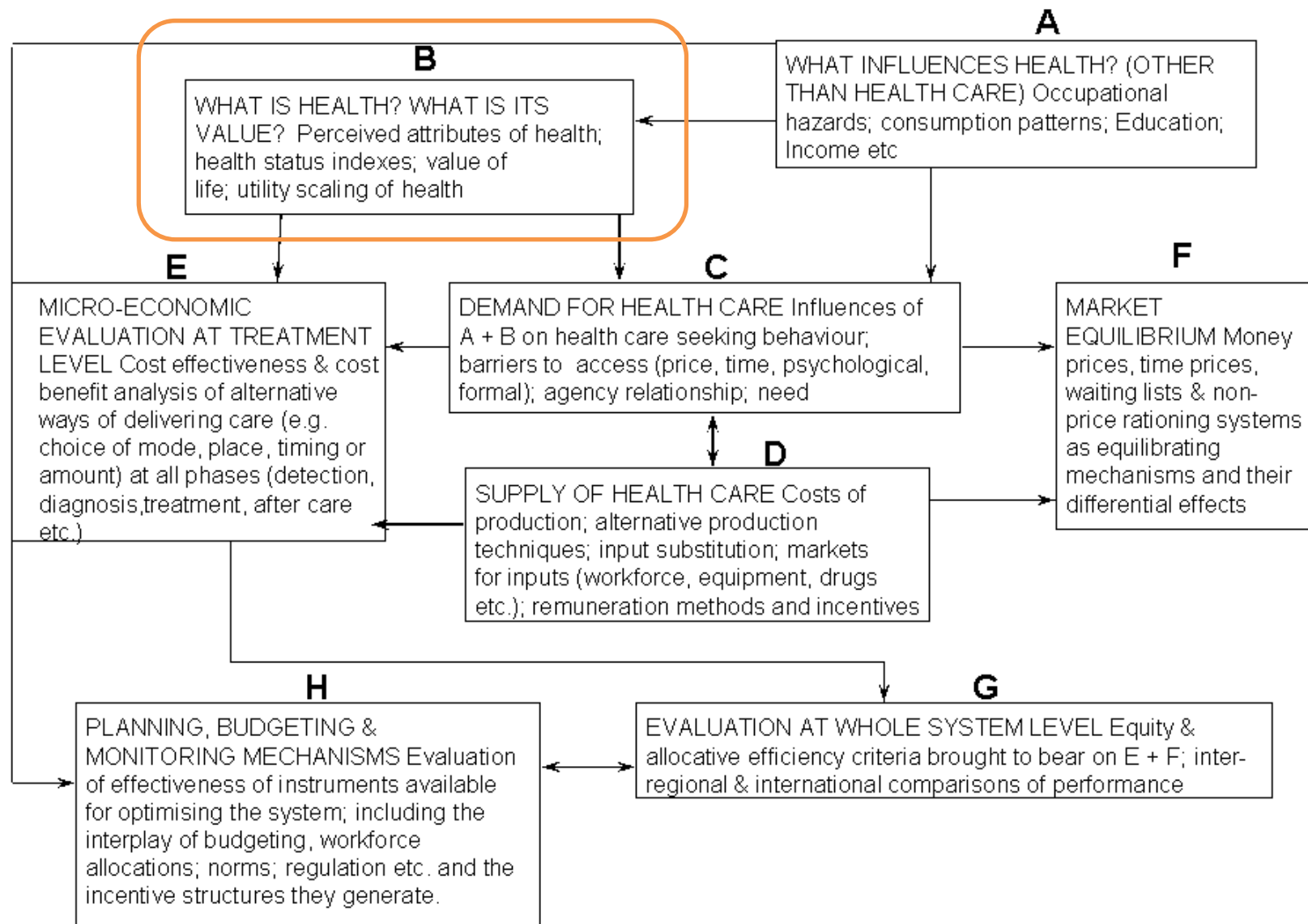
STEEN CARLSSON K; LOVÉN I for the Swedish Childhood Diabetes Register Study Group  
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Skiljer sig utbildningsvägarna för personer som insjuknar typ 1 diabetes före 15 års ålder från matchade befolkningskontroller?

### **Slutsats**

- Personer med typ 1 diabetes hade större sannolikhet att genomföra hälsoorienterade utbildningar
  - Gymnasiet
  - Universitetet
- Hälsoorienterade utbildningar leder till yrken i olika delar av lönefördelningen





Alan Williams kopplingschema från 1987

# Analysis of three outcome measures in moderate to severe psoriasis: a registry-based study of 2450 patients

J.M. Norlin,<sup>\*†</sup> K. Steen Carlsson,<sup>†‡</sup> U. Persson<sup>†§</sup> and M. Schmitt-Egenolf<sup>\*</sup>

<sup>\*</sup>Division of Dermatology and Venereology, Department of Public Health and Clinical Medicine, Umeå University, SE-901 85 Umeå, Sweden

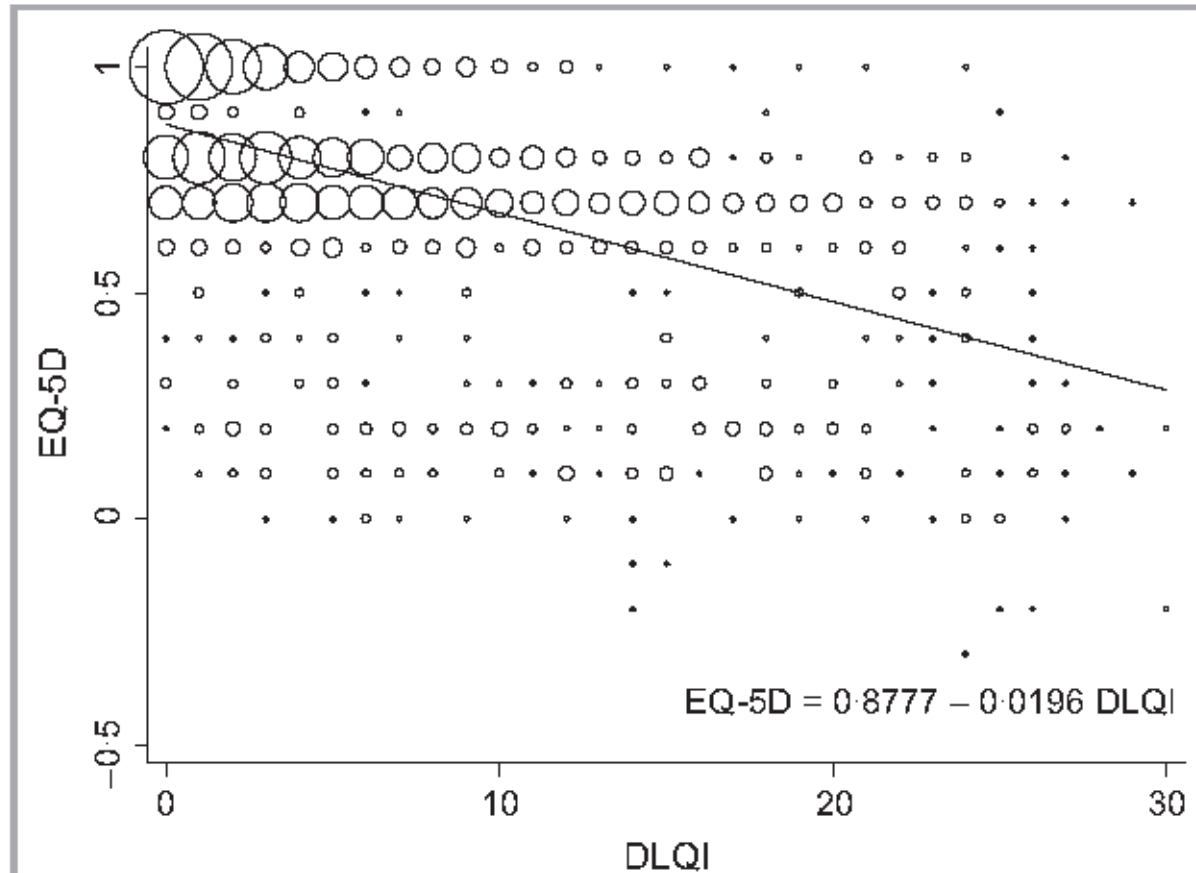
<sup>†</sup>The Swedish Institute for Health Economics, Lund, Sweden

<sup>‡</sup>Department of Clinical Sciences, Skåne University Hospital, Clinical Research, Lund University, Malmö, Sweden

<sup>§</sup>Institute for Economic Research, School of Economics, Lund University, Lund, Sweden

- PsoReg, nationellt kvalitetsregister för moderat till svår psoriasis
- Socialstyrelsen
  - Patientregistret, Läkemedelsregistret
- Statistiska centralbyrån
  - LISA





- Hälsomått och livskvalitetsmått mäter olika saker
- Korrelation mellan sjukdomsspecifikt livskvalitetsmått och generiska EQ-5D starkare än mellan EQ-5D och kliniskt mått (PASI)



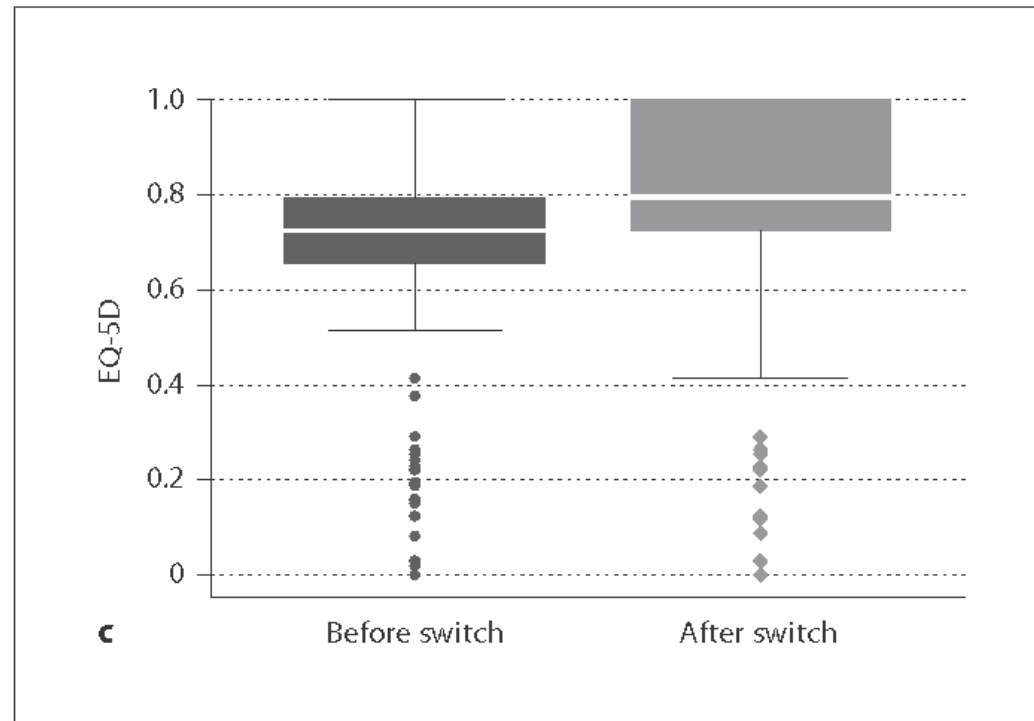
## Switch to Biological Agent in Psoriasis Significantly Improved Clinical and Patient-Reported Outcomes in Real-World Practice

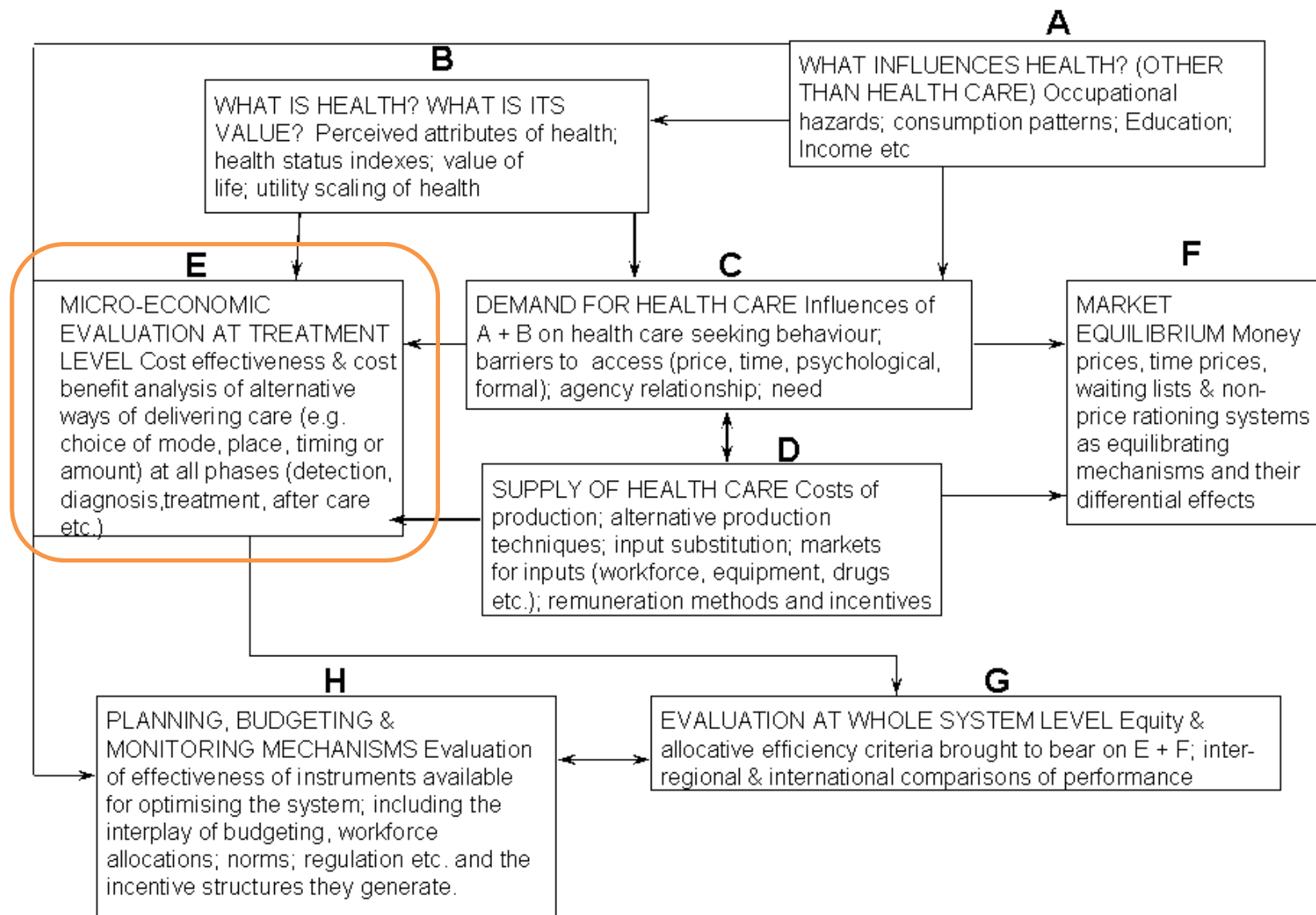
Jenny M. Norlin<sup>a,b</sup> Katarina Steen Carlsson<sup>b,c</sup> Ulf Persson<sup>b,d</sup>  
Marcus Schmitt-Egenolf<sup>a</sup>

Livskvalitet med EQ-5D

Före och efter start av biologisk behandling

Största förbättringen hos personer med mest besvär (störst PASI)





Alan Williams kopplingschema från 1987

# Towards Renewed Health Economic Simulation of Type 2 Diabetes: Risk Equations for First and Second Cardiovascular Events from Swedish Register Data

Aliasghar Ahmad Kiadaliri<sup>1,2,3\*</sup>, Ulf-G. Gerdtham<sup>1,2,4</sup>, Peter Nilsson<sup>5</sup>, Björn Eliasson<sup>6</sup>, Soffia Gudbjörnsdottir<sup>6</sup>, Katarina Steen Carlsson<sup>1,2</sup>

**1** Division of Health Economics, Department of Clinical Sciences, Malmö University Hospital, Lund University, Malmö, Sweden, **2** Health Economics & Management, Institute of Economic Research, Lund University, Lund, Sweden, **3** Department of Health Management and Economics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran, **4** Department of Economics, Lund University, Lund, Sweden, **5** Department of Clinical Sciences, Malmö University Hospital, Lund University, Malmö, Sweden, **6** Department of Medicine, Sahlgrenska University Hospital, University of Gothenburg, Gothenburg, Sweden

## Målsättningar

### Nya riskekvationer för kardiovaskulära händelser

- Akut hjärtinfarkt
- Hjärtsvikt
- Icke-akut ischemisk hjärtsjukdom
- Stroke

Skillnad i risk för första och andra kardiovaskulär händelse?



# Towards Renewed Health Economic Simulation of Type 2 Diabetes: Risk Equations for First and Second Cardiovascular Events from Swedish Register Data

Aliasghar Ahmad Kiadaliri<sup>1,2,3\*</sup>, Ulf-G. Gerdtham<sup>1,2,4</sup>, Peter Nilsson<sup>5</sup>, Björn Eliasson<sup>6</sup>,  
Soffia Gudbjörnsdottir<sup>6</sup>, Katarina Steen Carlsson<sup>1,2</sup>

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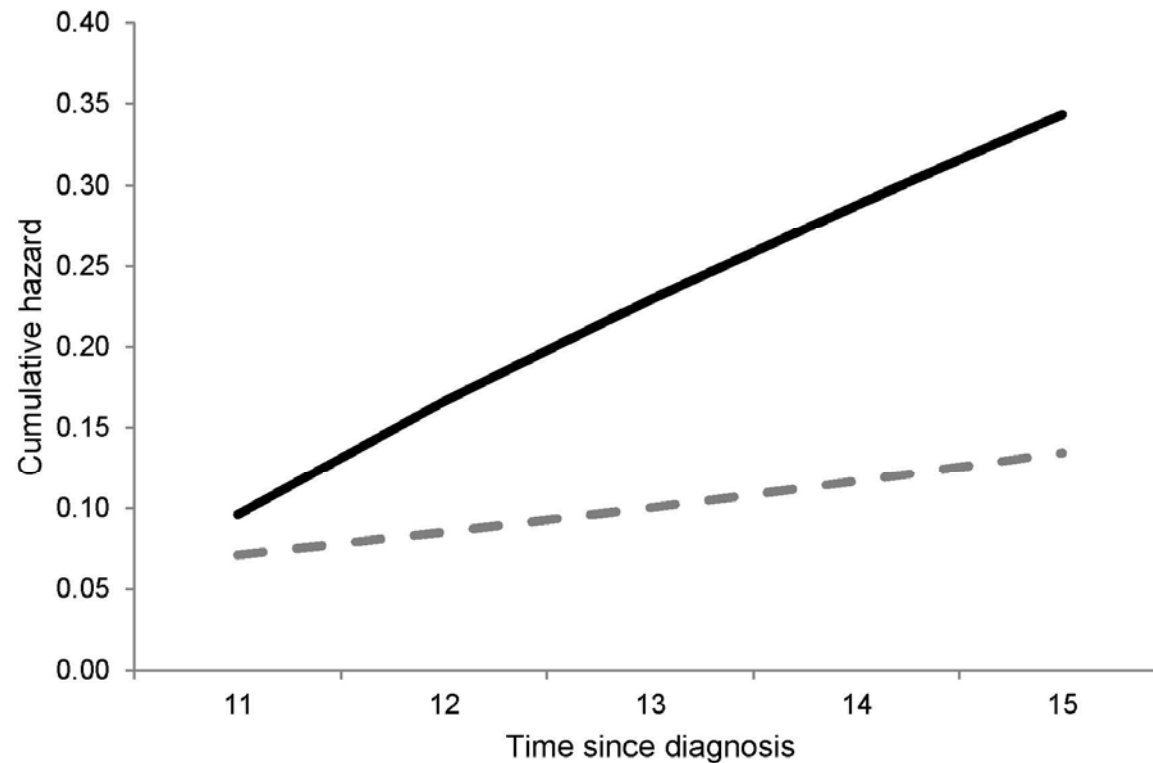
Nationella Diabetes Registret, NDR

29,034 personer med typ 2-diabetes registrerade i NDR  
2003-2008

Socialstyrelsens patientregister







**Figure 1. Predicted cumulative hazard of first (dashed grey line) and second (solid black line) AMI.** Cumulative hazards for a non-smoking 58-year-old male with diabetes duration 10 years, total cholesterol 4.3 mmol/l, HDL cholesterol 1.0 mmol/l, LDL cholesterol 2.0 mmol/l, HbA1c 8.0%, systolic BP 150 mmHg, macroalbuminuria, no history of previous AMI before diagnosis, and no CHF during follow-up. For second AMI, it was assumed that the patient had his first AMI in the 10<sup>th</sup> year after diagnosis.  
doi:10.1371/journal.pone.0062650.g001

- Stor skillnad i risk för första och andra hjärt-kärlhändelse
- Viktigt att beakta detta i simuleringsmodeller

# Ekonomiska simuleringsmodeller

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- Systematisk jämförelse av två eller flera alternativ med avseende på såväl kostnader som konsekvenser
- Bygger ihop kunskap från flera källor
  - Samband, riskekvationer
  - Effekter
  - Resursanvändning
  - Priser



# Validation of the IHE Cohort Model of Type 2 Diabetes and the Impact of Choice of Macrovascular Risk Equations

Adam Lundqvist<sup>1\*</sup>, Katarina Steen Carlsson<sup>1,2</sup>, Pierre Johansen<sup>1</sup>, Emelie Andersson<sup>1</sup>, Michael Willis<sup>1</sup>

<sup>1</sup> The Swedish Institute for Health Economics, IHE, Lund, Sweden, <sup>2</sup> Department of Clinical Sciences, Lund University, Malmö, Sweden

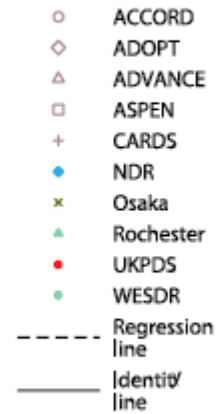
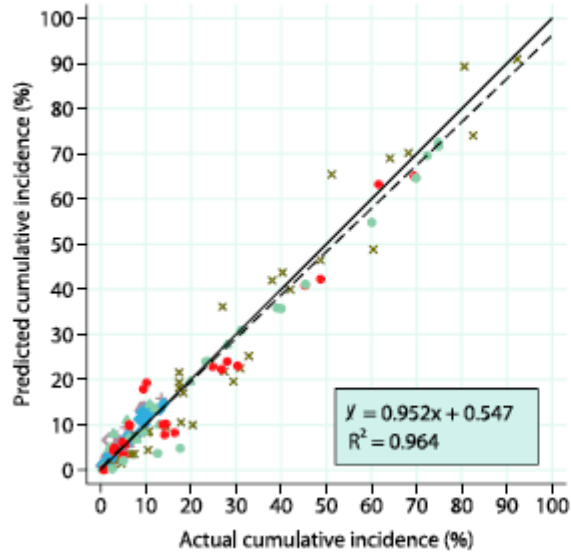
Är kohortmodellen tillräckligt bra på att göra prognoser för diabeteskomplikationer?

Mata modellen med baseline och utfallsdata från kliniska prövningar och observationella studier

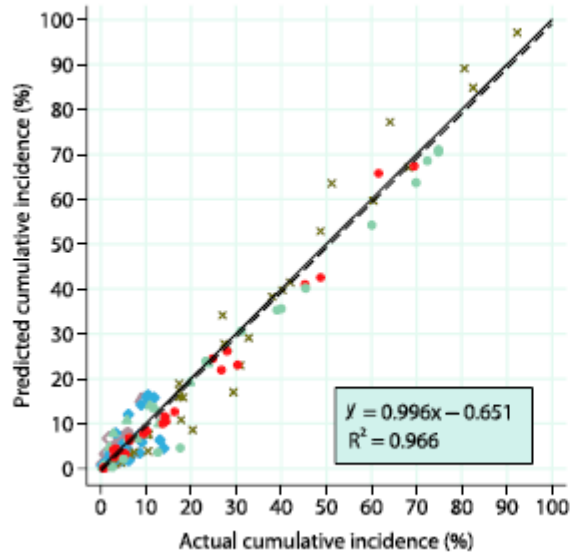
- Hur väl predikterar modellen observerade utfall?



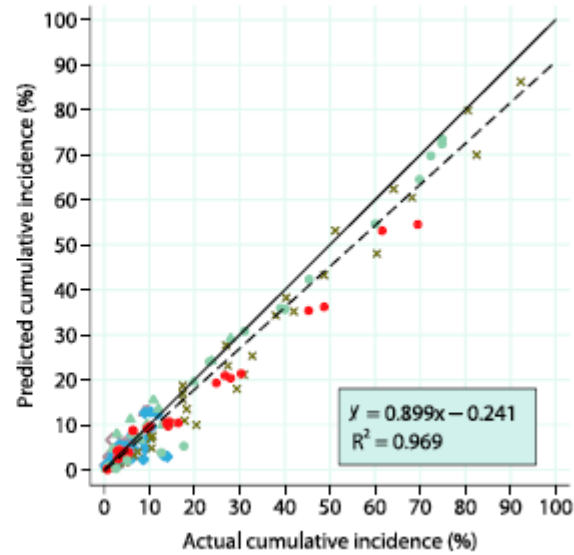
(A) NDR



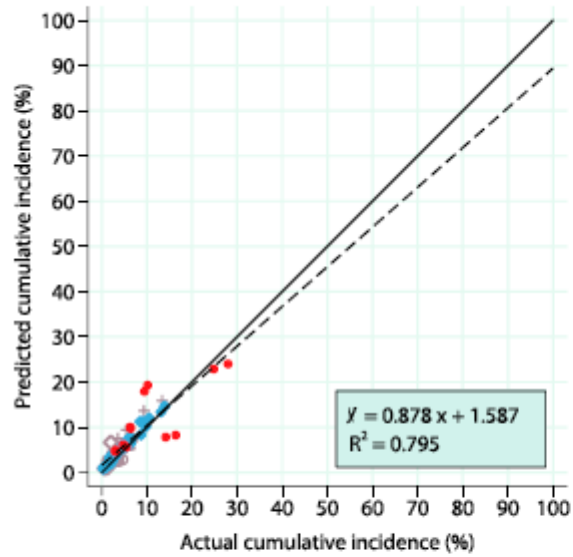
(B) UKPDS-1



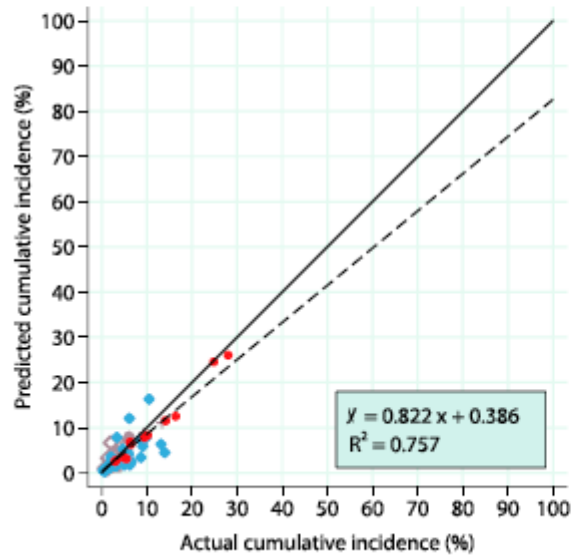
(C) UKPDS-2



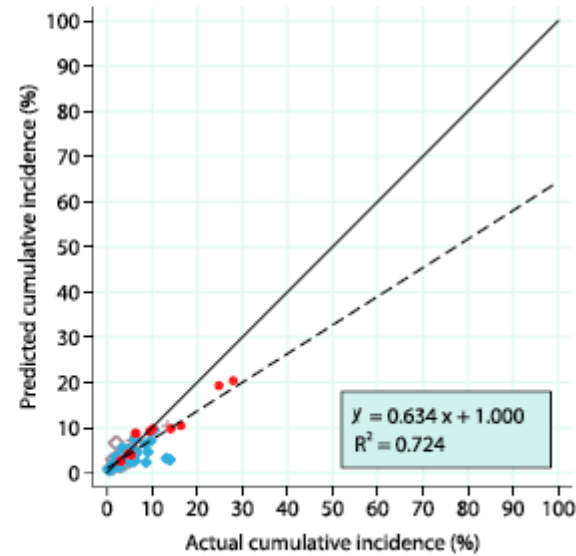
(A) NDR



(B) UKPDS-1



(C) UKPDS-2



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## Slutsats

Kohortmodellen gav fullt acceptabla prognoser för diabeteskomplikationer trots

- gruppnivådata
- definitionsmässigt icke-linjära samband

Kontextrelevanta data kan ha stor betydelse för modellvaliditet

- NDR-baserade ekvationer predikterade makrovaskulära händelser bäst



# Avslutningsvis – axplock av ekonomiska frågeställningar

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- Faktorer som påverkar hälsa
  - Utbildning => hälsa
  - Hälsa => utbildning
- Hur mäter vi hälsa? Vad är dess värde?
  - Livskvalitet mm
- Metoder för att utvärdera behandlingar
  - Simuleringsmodeller mm
- (och så finns det ytterligare 5 boxar...)





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