

# BORIS-forskning





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# Steatotic liver disease and increased risk of youth-onset type 2 diabetes

Resthie R Putri, Thomas Casswall, Pernilla Danielsson Liljeqvist, Claude Marcus, Emilia Hagman

Full article:



Popular summary:



# Outline

- **What did we study?**
- Why this study is important
- How BORIS and Swedish registers were excellent sources for this study
- Main findings
  - The effect of fatty liver disease (MASLD) on type 2 diabetes
  - Response of paediatric obesity treatment
- Summary

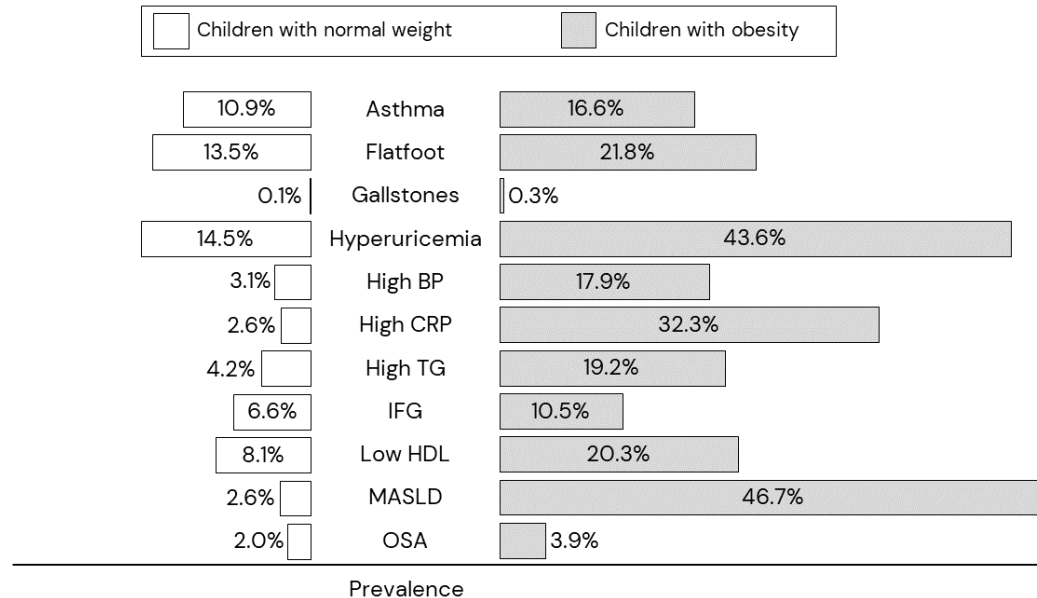


Does metabolic dysfunction associated steatotic liver disease (MASLD) increase the risk of youth-onset type 2 diabetes in children with obesity?

# Outline

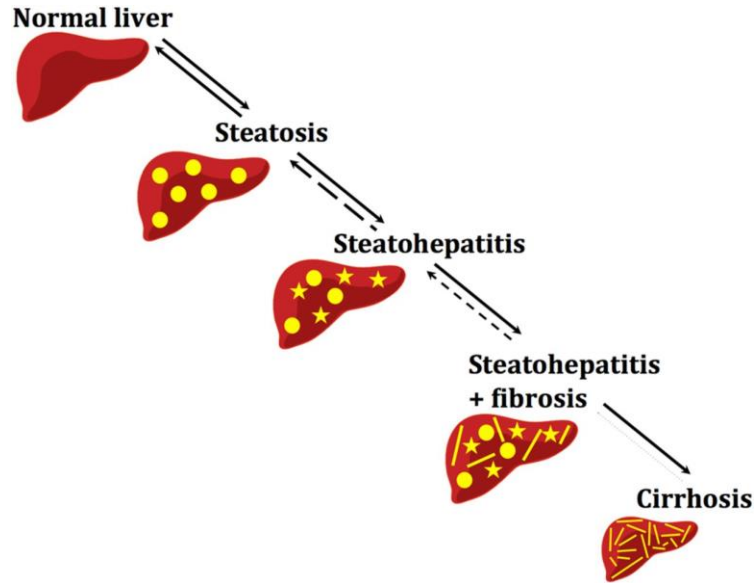
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# MASLD, one of the most common morbidity in children with obesity



Ref: Sharma V, Obes Rev, 2019

# Metabolic dysfunction associated steatotic liver disease (MASLD) in children



- Previous name: non-alcoholic fatty liver disease.
- Main drivers: obesity & insulin resistance.
- Clinically silent in most cases.
- No approved pharmacological treatment for children yet.

Image from: Mann JP, Archives of Disease in Childhood, 2015

# Diseases associated with MASLD in adults



Cirrhosis and liver cancer



Chronic kidney disease



Type 2 diabetes



Cardiovascular disease



Hypertension

Ref: Chan KE, Clinical Gastroenterology and Hepatology, 2024



# Diseases associated with MASLD in ~~adults~~ children



Cirrhosis and liver cancer



Chronic kidney disease



Type 2 diabetes



Cardiovascular disease



Hypertension



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MASLD in children has been hypothesised to have worse outcomes than adult MASLD.

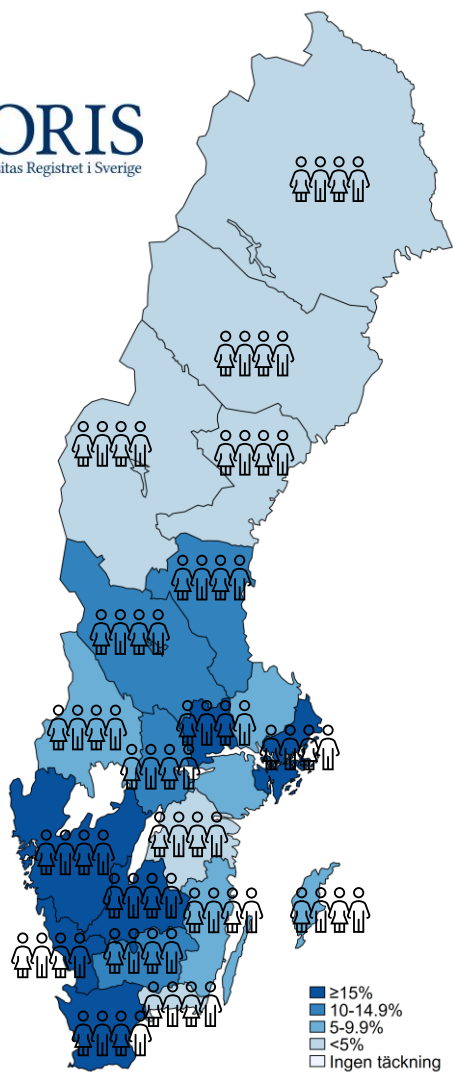


The previous studies were limited.

- Small sample size, short follow-up
- From people joining military service

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PERSONNUMMER



**National  
Patient  
Register**

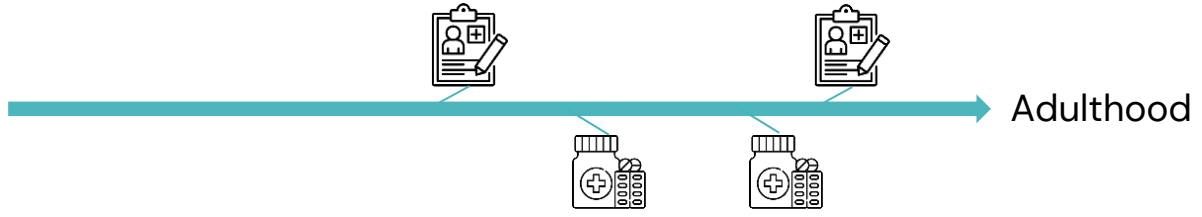
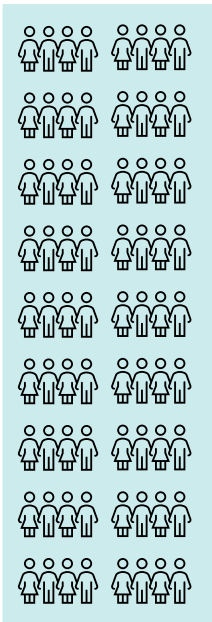


**Prescribed  
Drug  
Register**

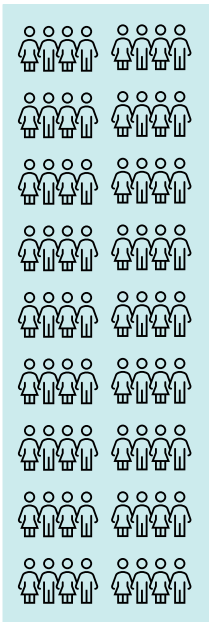




Children  
undergoing  
obesity  
treatment



Children  
undergoing  
obesity  
treatment



MASLD

No MASLD

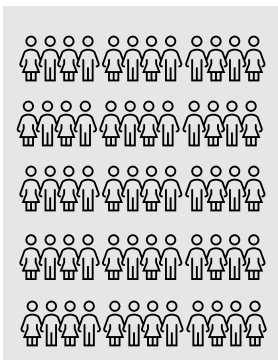


Follow-up from age 9 up to 30 years



**Type 2  
diabetes**

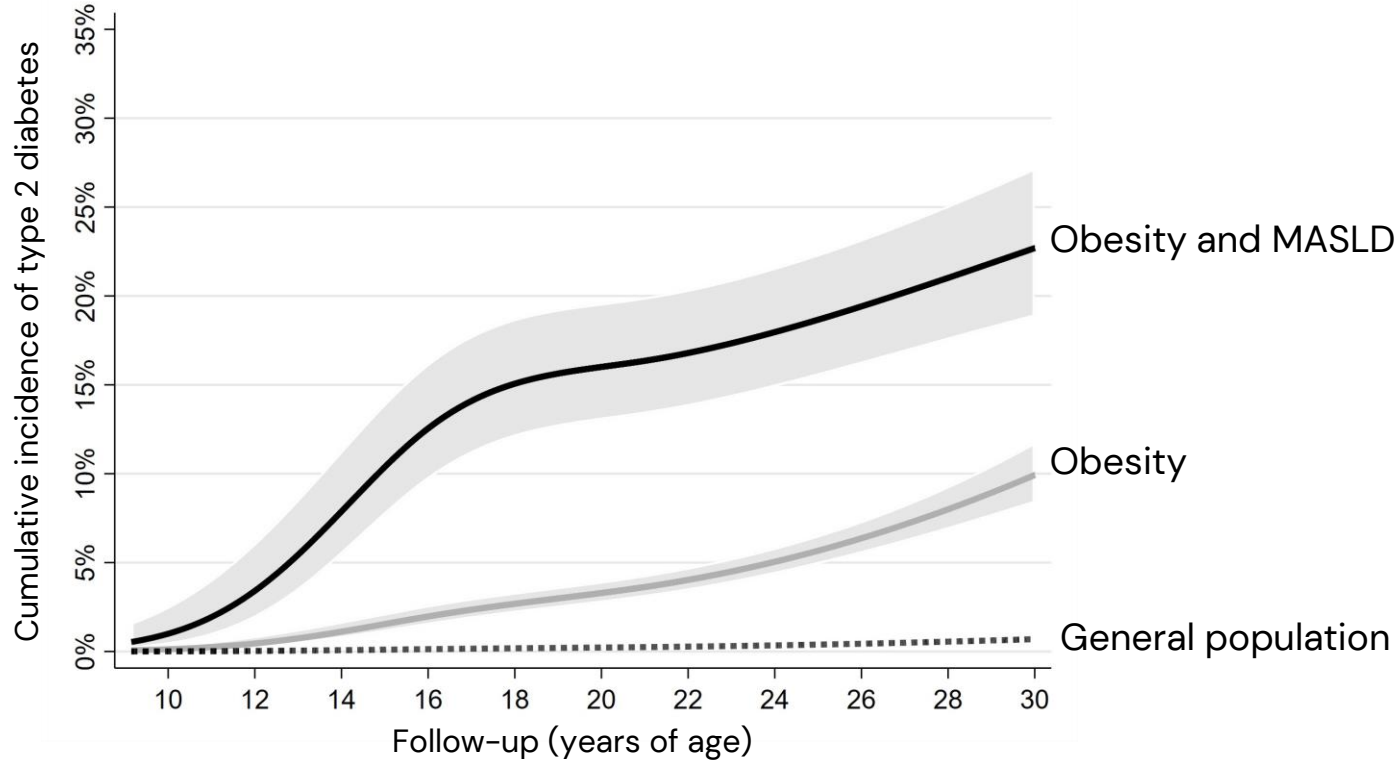
General  
population:  
same birth  
year, sex,  
residential  
area



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# Children with obesity and MASLD had the greatest incidence of type 2 diabetes



Higher degree of obesity?

Elevated fasting glucose?

Parental type 2 diabetes?



# MASLD in paediatric obesity is associated with 2.7 times higher risk of youth-onset type 2 diabetes.

Hazard ratio	Age 9 – 30 y	Age 9 – 19 y	Age 20 – 30 y
No MASLD	Ref	Ref	Ref
<b>MASLD</b>	<b>2.71 (2.14 – 3.43)**</b>	<b>3.99(2.99 – 5.32)**</b>	<b>1.28 (0.79 – 2.07)</b>

Adjusted for sex, age, degree of obesity, intermediate hyperglycaemia at baseline, parental type 2 diabetes

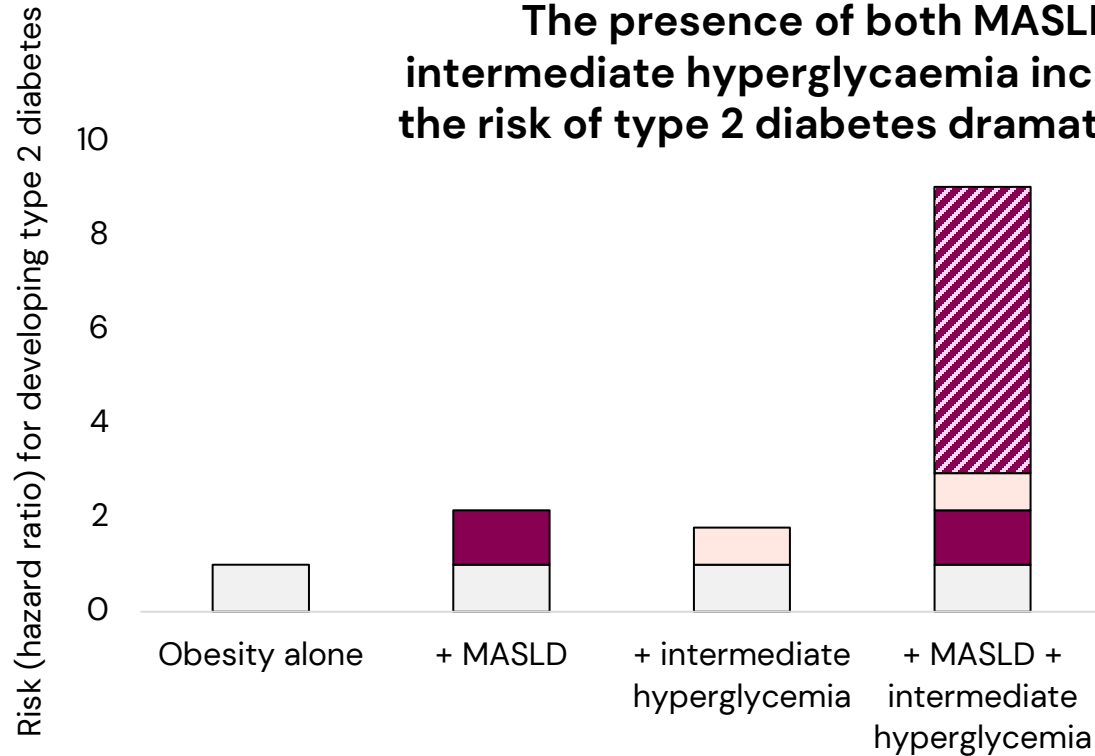
\* P < 0.05, \*\* p < 0.001



## MASLD vs intermediate hyperglycaemia on the risk of type 2 diabetes

Intermediate hyperglycaemia/ prediabetes:  
fasting glucose 6.1–6.9 mmol/L or HbA1c 39–46 mmol/mol

## The presence of both MASLD and intermediate hyperglycaemia increase the risk of type 2 diabetes dramatically





BMI reduction of at least 0.25 SDS (median treatment: 17.3 months) was associated with **77% relative risk reduction** of type 2 diabetes, regardless of MASLD, HR = 0.23 (0.09–0.57).

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- **Summary**

- MASLD in paediatric obesity is associated with 2.7 times higher risk of youth-onset type 2 diabetes.
- The risk is dramatically higher if MASLD and intermediate hyperglycaemia are present at baseline.
- Optimal obesity treatment response reduced type 2 diabetes risk by 77%, regardless of MASLD.

Full article:



Popular summary:



- Liver and glucose screening should both be a regular part of obesity management.
- A decrease in the degree of obesity in paediatric years is essential to prevent youth-onset type 2 diabetes



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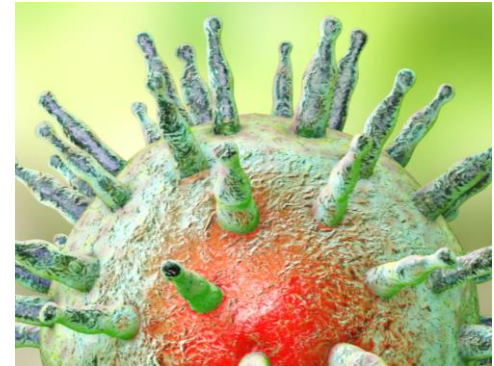
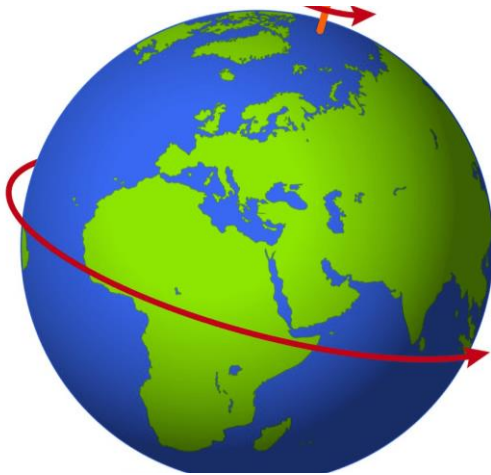
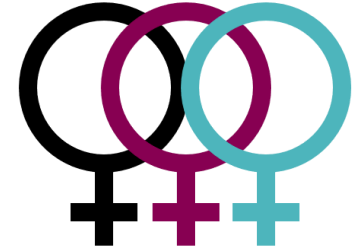
# Mer BORIS-forskning

# Barnobesitas och risk för multipel skleros

Preliminära resultat



# Risikfaktorer för MS



# Tidigare forskning

- Högt BMI i ung ålder beräknas bidra till mer än 10% av alla MS-fall.
- Det har föreslagits att associationen mellan tidig obesitas och MS endast gäller för obesitas i ungdomsåren och inte i barndomen.

*Vårt syfte: att jämföra risken för MS hos barn och ungdomar i BORIS med en matchad kontrollgrupp från den generella populationen.*

*Pakpoor J, et al. Int J Epidemiol 2021; Hedstrom AK, et al. Mult Scler 2016; Olsson T, et al. Nat Rev Neurol 2017;*

# Kohort-studie



BORIS  
n = 21 652



Median (Q1, Q3) uppföljningstid  
5.6 (3.0, 9.6) år



MS diagnos  
Emigration  
Död  
Augusti 2023

Generella populationen  
n = 102 187



# Kopplingen mellan obesitas och MS

- Långvarig låggradig inflammation
- Kost och tarmflora
- Delad genetisk sårbarhet – osannolikt
  
- Obesitas-duration?
- Blir det en additiv effekt av obesitas och kända riskfaktorer, ex vitamin D-brist?

# Annann BORIS-forskning

# Hur används BORIS för forskning?

- Studier inom BORIS
- Kontrollgrupper från BORIS
- BORIS länkat till andra register eller kohorter
  
- Etiskt tillstånd krävs
- Personnummer lämnas inte ut till enskild forskare

Kvalitets- och förbättringsarbete på mottagningen kräver inget etiskt tillstånd. Vi kan hjälpa till med enklare arbete.

# Response of Severely Obese Children and Adolescents to Behavioral Treatment

Pernilla Danielsson, RN, PhD; Jan Kowalski, BA; Örjan Ekblom, PhD; Claude Marcus, MD, PhD

International Journal of Obesity (2019) 43:1988–1994  
<https://doi.org/10.1038/s41366-019-0384-2>

ARTICLE

Pediatrics

## The effect of weight loss and weight gain on blood pressure in children and adolescents with obesity

Emilia Hagman<sup>1</sup> · Pernilla Danielsson<sup>1</sup> · Amira Elimam<sup>1</sup> · Claude Marcus<sup>1</sup>

ORIGINAL ARTICLE

## Impaired fasting glucose prevalence in two nationwide cohorts of obese children and adolescents

E Hagman<sup>1,5</sup>, T Reinher<sup>2,5</sup>, J Kowalski<sup>1</sup>, A Ekblom<sup>3</sup>, C Marcus<sup>1,6</sup> and RW Holl<sup>4,6</sup>

ORIGINAL RESEARCH

Pediatric OBESITY

WILEY

## Paediatric obesity treatment during 14 years in Sweden: Lessons from the Swedish Childhood Obesity Treatment Register—BORIS

Emilia Hagman<sup>1</sup> | Pernilla Danielsson | Louise Lindberg<sup>1</sup> | Claude Marcus | on behalf of the BORIS Steering Committee

Karolinska Institutet – ett medicinskt universitet

## Laparoscopic Roux-en-Y gastric bypass in adolescents with severe obesity (AMOS): a prospective, 5-year, Swedish nationwide study

Torsten Olbers, Andrew J Beamish, Eva Gronowitz, Carl-Erik Flodmark, Jovanna Dahlgren, Gustaf Bruze, Kerstin Ekblom, Peter Friberg, Gunnar Gåthman, Krister Länshalm, Jan Karlsson, Staffan Mårild, Martin Neovius, Markus Daltman, Claude Marcus

The Journal of Clinical Endocrinology & Metabolism, 2023, 00, 1–7  
<https://doi.org/10.1210/clinem/dgad419>  
 Advance access publication 15 July 2023

Clinical Research Article



## Height and Growth Velocity in Children and Adolescents Undergoing Obesity Treatment: A Prospective Cohort Study

Resthie R P

RESEARCH ARTICLE

Open Access

## Anxiety and depression in children and adolescents with obesity: a nationwide study in Sweden



RESEARCH ARTICLE

## Association of childhood obesity with risk of early all-cause and cause-specific mortality: A Swedish prospective cohort study

Louise Lindberg<sup>1,\*</sup>, Pernilla Danielsson<sup>1</sup>, Martina Persson<sup>2,3,4</sup>, Claude Marcus<sup>1</sup>, Emilia Hagman<sup>1</sup>

Tack vare er så lär vi oss mer om  
barnobesitas!

## **Acknowledgments**

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