novo nordisk foundation
Science Cluster

Conference 2023
30 October - 3 November

Prevention of Childhood Obesity

Programme & Abstract Book

Programme

Find the programme online here

Monday 30 October 2023

16:00 - 17:00	Scientific Committee meeting (members only)
17:15	Transportation to Favrholm from Hotel Hillerød
17:30 - 19:00	Informal dinner at Favrholm
19:00 - 19:15	**Official Opening by Arne Astrup**, Senior Vice President, Obesity and Nutritional Sciences, Novo Nordisk Foundation
19:15 - 20:30	**SESSION 1: The background of the childhood obesity problem**
	Welcome by the Scientific Committee: Morten K Grønbæk, Centre for Childhood Health, Denmark
	INVITED SPEAKER: **John J Reilly**, University of Strathclyde, Scotland, United Kingdom *Health consequences of child and adolescent obesity*
	INVITED SPEAKER: **David B Allison**, Indiana University School of Public Health-Bloomington, United States *Pediatric Intervention Effectiveness – Caveat Emptor*
	CHAIR: **Thorkild I A Sørensen**, Centre for Childhood Health and University of Copenhagen, Denmark
20:30 - 22:30	Drinks & Networking

Tuesday 31 October 2023

09:00 - 10:20	**SESSION 2: Challenges and perspectives in prevention of childhood obesity**
	INVITED SPEAKER: **Steven L Gortmaker**, Harvard Chan School of Public Health, United States *Interventions that can cost effectively prevent obesity and chronic disease and improve health equity*
	SHORT TALK: **Abigail Pickard**, Aston University, United Kingdom *Identifying an avid eating profile in childhood: Associations with temperament, feeding practices and food insecurity*
	INVITED SPEAKER: **Rachael Taylor**, University of Otago, New Zealand *Move, eat, sleep, repeat: Should we be focusing more on sleep as the answer to child obesity?*
	CHAIR: **Berit L Heitmann**, Frederiksberg and Bispebjerg Hospital and University of Copenhagen, Denmark
10:20 - 10:50	Coffee break
10:50 - 12:30	**SESSION 3: Prevention of childhood obesity during childhood**
	INVITED SPEAKER: **Carolyn Summerbell**, Durham University, United Kingdom *Evidence from trials of interventions to prevent childhood obesity: What is most likely to decrease health inequalities and why?*
	INVITED SPEAKER: **Berit L Heitmann**, Frederiksberg and Bispebjerg Hospital and University of Copenhagen, Denmark *Primary prevention of childhood obesity – is it possible?*
	SHORT TALK: **Nanna J Olsen**, Bispebjerg and Frederiksberg Hospital, Denmark *Long-term effects of a primary weight gain prevention intervention among healthy weight obesity susceptible children. Results from the Healthy Start study.*
	PANEL DISCUSSION: What is the outcome of the tested interventions?
	David B Allison, Indiana University School of Public Health-Bloomington, United States **Berit L Heitmann**, Frederiksberg and Bispebjerg Hospital and University of Copenhagen, Denmark **Carolyn Summerbell**, Durham University, United Kingdom **Rachael Taylor**, University of Otago, New Zealand **Steven L Gortmaker**, Harvard Chan School of Public Health, United States
	CHAIR: **Morten K Grønbæk**, Centre for Childhood Health, Denmark
12:30 - 13:30	Lunch

13:30 - 15:30	**SESSION 4: Policy implications and the implied stigmatization and discrimination**
	INVITED SPEAKER: **Tim Lobstein**, World Obesity Federation, United Kingdom *Global challenges to child obesity prevention*
	INVITED SPEAKER: **Jane Martin**, Food for Health Alliance, Australia *How do we accelerate progress in prevention of childhood obesity?*
	INVITED SPEAKER: **Stuart W Flint**, University of Leeds, United Kingdom *Pervasiveness, impact and implications weight stigma and discrimination experienced by children and young people living with obesity; why we need to act!*
	SHORT TALK: **Rikke Fredenslund Krølner**, University of Southern Denmark, Denmark *Food for thought: Theorizing, investigating, and avoiding unintended outcomes of prevention of childhood obesity*
	CHAIR: **Teresa Holmberg**, Centre for Childhood Health, Denmark
15:30 - 15:45	Group photo
15:45 - 17:30	**POSTER SESSION**
18:00 - 20:00	Dinner
20:00 - 22:00	PI Pub / Editors' Corner

Wednesday 1 November 2023

09:00 - 10:45	**SESSION 5: Causes of obesity: Genetics and gene-environment interaction**
	INVITED SPEAKER: **Ruth Loos**, Novo Nordisk Foundation Center for Basic Metabolic Research, University of Copenhagen, Denmark *Why do parents with obesity more often have children with obesity?*
	INVITED SPEAKER: **Janine Felix**, Erasmus University Rotterdam, The Netherlands *Genetics of childhood obesity*
	INVITED SPEAKER: **Ken Ong**, University of Cambridge, United Kingdom *How does genetics inform the prevention of childhood obesity?*
	CHAIR: **Thorkild I A Sørensen**, Centre for Childhood Health and University of Copenhagen, Denmark
10:45 - 11:15	Break
11:15 - 12:30	**SESSION 6: Causes of obesity: Protein intake and developmental patterns**
	INVITED SPEAKER: **Marie Françoise Rolland-Cachera**, Paris 13 University, France *Early nutrition and adiposity rebound*
	INVITED SPEAKER: **Stephen Simpson**, University of Sydney, Australia *Protein leverage in childhood obesity*
	SHORT TALK: **Hanyue Zhang**, Bispebjerg and Frederiksberg Hospital, Denmark *A low dietary protein intake seems related to impaired growth among 2–6-year-old obesity-prone children: Evidence for the Protein Leverage Hypothesis*
	CHAIR: **Berit L Heitmann**, Frederiksberg and Bispebjerg Hospital and University of Copenhagen, Denmark
12:30 - 13:30	Lunch
13:30 - 15:15	**POSTER SESSION**
15:15 - 16:45	**SESSION 7: Causes of obesity: Modifiable environmental / behavioural factors**
	INVITED SPEAKER: **David Ludwig**, Boston Children's Hospital, United States *The Carbohydrate-Insulin Model: A physiological perspective on the obesity pandemic*
	INVITED SPEAKER: **Mark Tremblay**, Children's Hospital of Eastern Ontario Research Institute, Canada *The importance of movement behaviors for healthy child development and obesity prevention*
	INVITED SPEAKER: **Erik Hemmingsson**, The Swedish School of Sports and Health Sciences, Sweden *Psychosocial causes of childhood obesity*
	CHAIR: **Thorkild I A Sørensen**, Centre for Childhood Health and University of Copenhagen, Denmark
17:00 - 18:00	Transport
18:00 - 22:00	Social outing and dinner
22:00 - 23:00	Transport back to Favrholm and Hotel Hillerød

Thursday 2 November 2023

09:00 - 10:15	**SESSION 8: Prevention of childhood obesity before and during pregnancy**
	INVITED SPEAKER: **Patrick Catalano**, Tufts University School of Medicine, United States *Dietary and lifestyle interventions during pregnancy on early childhood outcomes – do we need to start before pregnancy?*
	SHORT TALK: **Christina Sonne Mogensen**, University of Copenhagen, Denmark *Effect of high protein and low glycemic index consumption during pregnancy on offspring metabolic health during the first five years of life*
	SHORT TALK: **Tamool Abdulhamid Saad Muhamed**, University Medical Center Groningen UMCG, The Netherlands *Mediating role of parental factors on socioeconomic inequalities in childhood overweight*
	CHAIR: **Nina R W Geiker**, Centre for Childhood Health, Denmark
10:15 - 10:45	Coffee break
10:45 - 11:45	**ROUND TABLE DISCUSSIONS (all running in parallel)**
	TOPIC: **How do we define and assess childhood obesity?** HOSTED BY: **John Reilly**, University of Strathclyde, Scotland, United Kingdom and **Camilla Trab Damsgaard**, University of Copenhagen, Denmark
	TOPIC: **What are the final goals of preventing childhood obesity?** HOSTED BY: **Leonard Epstein**, University at Buffalo, United States and **Jens Melgaard Bruun**, Danish National Center for Obesity, Denmark
	TOPIC: **How does the political-societal-economic context influence the possibilities for preventing childhood obesity?** HOSTED BY: **Erik Hemmingsson**, The Swedish School of Sports and Health Sciences, Sweden and **Steven L Gortmaker**, Harvard Chan School of Public Health, United States
	TOPIC: **Which phases of life offers the best opportunities for prevention of childhood obesity?** HOSTED BY: **Rachael Taylor**, University of Otago, New Zealand and **Christian Mølgaard**, University of Copenhagen, Denmark
	TOPIC: **Is individual, high risk group or general structural prevention the way to go?** HOSTED BY: **Ken Ong**, University of Cambridge, United Kingdom and **James Nobles**, Leeds Beckett University, United Kingdom
	TOPIC: **What are the ethical and cultural implications and challenges of actions to prevent childhood obesity?** HOSTED BY: **Stuart W Flint**, University of Leeds, United Kingdom and **Tatjana Hejgaard**, Danish Health Authority, Denmark
11:45 - 13:00	Lunch
13:00 - 14:30	**SESSION 9: Implementation and sustainability**
	INVITED SPEAKER: **Jacob (Jaap) C Seidell**, Vrije University Amsterdam, The Netherlands *Prevention of childhood obesity in The Netherlands*
	INVITED SPEAKER: **James Nobles**, Leeds Beckett University, United Kingdom *Applying a system approach to childhood obesity*
	SHORT TALK: **Peter Bergsten**, Uppsala University, Sweden *The Swedish Ending Childhood Obesity Initiative*
	CHAIR: **Teresa Holmberg**, Centre for Childhood Health, Denmark
14:30 - 15:00	Coffee break
15:00 - 16:30	**SESSION 10: Future perspectives**
	INVITED SPEAKER: **Zachary Gerhart-Hines**, University of Copenhagen, Denmark *A novel target for the treatment of obesity and diabetes*
	INVITED SPEAKER: **Leonard Epstein**, Jacobs School of Medicine and Biomedical Sciences, University at Buffalo, United States *Family-based interventions to treat and prevent obesity across generations*
	INVITED SPEAKER: **Louise Alison Baur**, University of Sydney, Australia *Where do we go from here? What is the future for prevention of obesity in children and adolescents*
	CHAIR: **Morten K Grønbæk**, Centre for Childhood Health, Denmark
16:30 - 16:45	**Closing remarks by the Chair of the Scientific Committee: Thorkild I A Sørensen**, Centre for Childhood Health and University of Copenhagen, Denmark
16:45 - 19:00	Transportation to and from Hotel Hillerød and Favrholm
19:15	Welcome drinks at Favrholm
19:45 - 02:00	Dinner & party at Favrholm

Friday 3 November 2023

09:00	Check-out from hotels
09:00	Bus departure from Hotel Hillerød → Favrholm campus → City centre → Copenhagen airport

novo nordisk foundation Science Cluster

Dear participants,

We are very happy to wish you a warm welcome to the "Prevention of Childhood Obesity Conference", which is organized by the Novo Nordisk Foundation and the Center for Childhood Health.

Obesity is a major health challenge that has reached pandemic dimensions with no clear solutions. During the last decades large steps forward have been taken in learning about the regulation of body fat. Finding thermogenic brown adipose tissue in adult humans, the discovery of the hormone leptin, elucidation of pathways in the brain that affect hunger and feeding behaviour, the quantification of adipocyte turnover, and the identification of single genes that produce rare but severe obesity are examples of such steps. However, despite this progress, several key questions remain to be answered to aid the prevention of obesity.

We have had the opportunity to put together a program, that includes some of the sharpest minds in the whole translational range of research in obesity prevention from all over the world. Together we will explore what we really know or don't know about actively preventing obesity among children? If this area is sparsely enlightened, what do we know about the effects on body and mind of developing obesity with regard to health and stigmatization? Like in most considerations of when to begin preventive measures, there is no doubt that in the case of prevention of obesity, childhood is a good place to start. Perhaps before, during pregnancy. Or perhaps even before that, during pre-pregnancy. A question, that will also be addressed. Finally, we will address how interventions can address the obesity issue in a whole systems approach.

We received a large number of high-quality applications. You have been carefully selected to participate from this pool, to ensure a comprehensive representation of fields and career stages. As a result, we believe everyone will bring something special to the conference. We hope that the Favrholm Campus over the next four days can provide a magnificent niche for social and scientific interactions for all of participants, and foster engagement and willingness to share most recent results.

We look forward to four interesting days at Favrholm and to focus on key scientific questions on childhood obesity research and how addressing such questions can move the field forward.

Thank you for your engaged participation.

Best wishes,
The Scientific Committee

Nina R W Geiker
Centre for Childhood Health
Denmark

Teresa Holmberg
Centre for Childhood Health
Denmark

Berit L Heitmann
Frederiksberg and Bispebjerg Hospital and University of Copenhagen
Denmark

Morten K Grønbæk
Centre for Childhood Health
Denmark

Thorkild I A Sørensen
Centre for Childhood Health and University of Copenhagen
Denmark

novo nordisk
foundation

Benefitting people and society

Established in Denmark in 1924, the Novo Nordisk Foundation is an enterprise foundation with philanthropic objectives. The vision of the Foundation is to improve people's health and the sustainability of society and the planet. The Foundation's mission is to progress research and innovation in the prevention and treatment of cardiometabolic and infectious diseases as well as to advance knowledge and solutions to support a green transformation of society.

Supporting independent research

All research grants awarded by the Foundation support free and independent research, with researchers deciding their research priorities and being able to publish as they wish. No company owned by the Foundation has preferential access to the research results funded by grants from the Foundation. Any research results belong to the researchers and their institutions.

The Foundation categorises funding into five models: Open competition, stand-alone grants, partnerships, impact investments and own initiatives. Each funding model contains a variety of funding instruments.

Expert advice

The Foundation has established a number of expert committees to review incoming applications. The members are internationally recognised experts in their field, often supplemented by experience gained as members of research councils and academic assessment committees. The committees serve as the Foundation's window to the research communities.

www.novonordiskfonden.dk/en/

Focus areas

The Foundation has defined three focus areas for its philanthropic activities towards 2030: Health, Sustainability and the Life Science Ecosystem, each of which contains four strategic themes.

Health

Mission:
Progress research and innovation in the prevention and treatment of cardiometabolic and infectious diseases

Theme 1:
Preventing cardiometabolic disease

Theme 2:
Understanding and managing cardiometabolic disease

Theme 3:
Fighting inequity in health

Theme 4:
Strengthening epidemic preparedness

Sustainability

Mission:
Advance knowledge and solutions to support the green transition in society

Theme 1:
Sustainable and high-yield agriculture

Theme 2:
Sustainable food for healthy diets

Theme 3:
High-impact climate change mitigation technologies

Theme 4:
Supporting society in the green transition

The Life Science Ecosystem

Mission:
Invest in scientific research, education and innovation to enable a world class life science ecosystem

Theme 1:
Fundamental research

Theme 2:
Enabling research infrastructures and technologies

Theme 3:
Translational capacity and societal impact

Theme 4:
Education and science capital

CENTRE FOR CHILDHOOD HEALTH

Who we are

The Centre for Childhood Health is a private, independent association dedicated to enhancing the health and well-being of children and young people in Denmark. We achieve this through collaborative efforts with key partners throughout the nation. The Centre for Childhood Health is visionary public-private partnership, jointly funded by the Danish Ministry of Health and the Novo Nordisk Foundation for a 10-year period from 2023-2032, committed to making a positive impact.

Centre for Childhood Health stands as an innovative institution, showcasing the successful blending of public and private sectors in Denmark, an accomplishment facilitated by a diverse board of representatives deeply committed to advancing child health and well-being.

Our board consists of members from the Danish Health Authority, the Ministry of the Interior and Health, the University of Copenhagen, Local Government Denmark, Danish Regions, The Novo Nordisk Foundation, and the Danish Veterinary and Food Administration. This ensures broad and impactful engagement with various stakeholders, including regional authorities, healthcare professionals, municipalities, teachers, healthcare workers, and educators, among others.

The challenge

High weight and obesity present a growing and serious health concern with severe adverse effects on health, quality of life and life expectancy. This issue has substantial societal implications. In Denmark, more than half of adults (53%) live with high weight, and 19% live with obesity. Current efforts to address this problem are fragmented and inadequate, with particular concern about the increasing prevalence of childhood obesity, which is a strong predictor of lifelong weight issues as well as psychosocial problems, low self-esteem, and health concerns, often accompanied by stigma. The link between high weight and mental health underscores the importance of addressing well-being as a contributing factor. Additionally, significant inequalities exist, with children of less educated parents at a three-fold greater risk of high weight or obesity. The risk of obesity persisting into adulthood can lead to a vicious cycle of health complications and socio-economic challenges, along with the issues of weight stigma and internalized stigma.

Our vision, goals, and focus areas

The vision of the Centre is for all children to grow up thriving and having a healthy weight that can be maintained throughout their lives. Our goals include supporting a nuanced perspective on weight and well-being, generating new knowledge on what promotes healthy weight and well-being, providing an updated knowledge base for professionals in the field, supporting frameworks and structures for promoting healthy weight and well-being in children and young people, and providing expert insights and contributions at every level of society.

- **New knowledge:** Create the basis for effective policies, initiatives and knowledge-based changes through interdisciplinary research and development.
- **Knowledge-based change and implementation:** Creating changes through research-based testing of scalable models for health promotion, prevention and treatment.
- **Competence development:** Create education and courses to secure dissemination of evidence-based knowledge and competencies for professionals and volunteers working with children and their families.
- **Knowledge sharing:** Collect and disseminate evidence-based knowledge within Denmark and internationally.

Children in Denmark, from before birth and up to 19 years of age, are the target group for the Centre. Children are not responsible for their own weight development, but if they develop overweight or obesity, they must live with the mental, social and physical health consequences. The main target groups for the Centre's activities are those who co-create the structural framework in settings in which children and parents live their everyday lives. This includes parents, professionals and volunteers in both healthcare, day-care, schools, municipalities, and the local communities.

Instruments

The Centre will specialise in knowledge and competencies to promote healthy weight and prevent obesity among children. The Centre will support research that develops novel ways to prevent overweight and activities that effectively promote healthy weight and well-being. The primary focus of the Centre is the development of health-promoting environments and prevention throughout the child's life cycle. The secondary focus of the Centre is to support the development of evidence-based, non-pharmacological treatment (lifestyle intervention) for children who have already developed overweight. Finally, the Centre will address inequality in health and overweight and work to obtain more knowledge on how to reduce and address weight stigma and potential health risks.

Childhood overweight is a complex condition, and solutions must involve a wide range of disciplines and actors. Activities will therefore be developed in close partnerships with central stakeholders, including municipalities, administrative regions, the state, research institutions, nongovernmental organisations and private actors. Activities to test and implement new strategies will be monitored by relevant research methods and will, when possible, be embedded in existing structures to ensure sustainable support.

An overall premise is that all Centre activities will be developed in close collaboration with target groups and relevant stakeholders. The Centre will initiate a wide range of activities to ensure that the vision is realised. All activities will be defined in action plans. Guiding principles for the Centre's activities are:

- focusing on initiating projects with a documented need for new knowledge or testing;
- supporting long-term research-based initiatives and research on effects when relevant;
- working evidence based but also with new, innovative activities;
- ensuring economic sustainability and aiming for integrating activities into existing structures;
- addressing inequity in health;
- coordinating activities in Denmark; and
- preventing weight stigma in all activities.

Our focus areas

New knowledge

Knowledge-based change and implementation

Competence development

Knowledge sharing

Practical information

Conference venue

Favrhom Campus | Roskildevej 58 | 3400 Hillerød

Name badges

All participants must wear their name badge all times. The badge must be visible.

Internet

At Hotel Hillerød you will find internet information in your room.

At Favrholm Campus all conference participants have free internet access with the following log in:

Network name (SSID): Favrholmguest / **Password:** access4guest

Cloak room

There are two cloak rooms at the venue. One next to the reception desk and one next to the Auditorium.

Shuttle bus

There is a shuttle bus between Hotel Hillerød and the conference venue Favrholm Campus - please find the shuttle bus schedule on the next page.

If you need transportation outside of the planned schedule, our staff is happy to assist you. The Novo Nordisk Foundation does not cover taxi expenses.

Own expenses

The Novo Nordisk Foundation does not cover minibar or phone expenses.

Poster mounting

Please put up your poster at your earliest convenience. The poster room is located downstairs from the reception at Favrholm Campus and Novo Nordisk Foundation staff will help assist you mounting your poster.

Poster dismounting

Remember to collect your poster in the lunch break on Thursday. Posters that have not been collected will be disposed.

Poster sessions

We have scheduled two poster sessions – Tuesday and Wednesday. All abstracts are arranged by topic and alphabetically. Please find the number of your poster and poster session day in the poster overview section of this book.

Poster competition

PhD Students and PostDocs presenting posters can participate in the poster competition. The judges will attend both poster sessions and select the winners, who will be announced during dinner on the last evening.

To sign up for the competition, use the red and yellow labels available in the poster room or ask our staff.

Upload of presentation (for presenters)

We will have a Mac computer and a pc available in the conference room, but you are also welcome to use your own computer. We kindly ask you to present yourself to the AV technician during the break before your session or 15 minutes before the morning session, to ensure that your presentation works properly and your computer's display settings are OK.

Rules for disclosure of presented data

At our conferences, we encourage presentations of new and unpublished data. We do not invite journalists or other people from the outside to attend our sessions, we do not promote any products or services, and we do not offer slides and video presentations after the conference.

The same applies to our conference participants, who cannot share unpublished data, photos, or upload presentations on social media.

Photography

During the conference, there will be a professional photographer present. The pictures will be shown on the screens during the conference. Some photos may be used on our conference website after the conference. Please let us know if you do NOT wish us to take any photos of you.

Breakfast

Breakfast is included at Hotel Hillerød and is served from 6:30 am.

Breakfast buffet for guests staying at Favrholm Campus opens at 7:30 am.

Exercise

You can use the exercise room and showers at Favrholm Campus at appropriate times.

Check out time

The check out time at Hotel Hillerød and Favrholm Campus is 9:00 am on Friday, 3 November 2023.

Special dietary requirements

We have informed our kitchen about the special dietary requests we received, when you registered, and they will prepare special meals accordingly when necessary. For the evening dinners, please make yourself known to the serving staff, when you sit down.

If you forgot to register your dietary requirements/allergies or do not remember registering them, please come see us at the reception of Favrholm Campus, so we are sure to have an updated list.

Social media

You can follow, tag us and share comments about the conference on X & LinkedIn.

#preventchildhoodobesity2023

handle: @ScienceCluster

LinkedIn page: Novo Nordisk Foundation Science Cluster

Notes

Shuttle bus schedule

Hotel Hillerød → Favrholm → Hotel Hillerød

Monday 30 October 2023

Departure from Hotel Hillerød → Favrholm	15:15	17:15
Departure from Favrholm → Hotel Hillerød	Shuttle bus 21:00-22:15	

Tuesday 31 October 2023

Departure from Hotel Hillerød → Favrholm	08:30
Departure from Favrholm → Hotel Hillerød	Shuttle bus 21:30-22:30

Wednesday 1 November 2023

Departure from Hotel Hillerød → Favrholm	08:30
Departure from Favrholm → Social outing	**17:00**
Departure from social outing → Favrholm / Hotel Hillerød	**22:30**

Thursday 2 November 2023

Departure from Hotel Hillerød → Favrholm	08:30	19:00
Departure from Favrholm → Hotel Hillerød	16:45	Shuttle bus 23:00 - 02:00

Friday 3 November 2023

Departure Hotel Hillerød → Favrholm → Copenhagen Central Station	**09:00 (Hotel Hillerød) 09:10 (Favrholm)**
Arrival Copenhagen Central Station approx. 10:00	
Departure Hotel Hillerød → Favrholm → Copenhagen Airport	**09:00 (Hotel Hillerød) 09:10 (Favrholm)**
Arrival Copenhagen Airport approx. 10:15	

Notes

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Poster overview

Tuesday 31 October 2023

Poster overview

Wednesday 1 November 2023

Index of speakers by name

Notes

Allison, David B

Dean, Distinguished Professor, and Provost Professor
Indiana University School of Public Health-Bloomington
United States

The childhood obesity intervention and prevention efficacy literature: Arguably less *trusted* than research in other domains, more *trusted* than it merits being, less *trustworthy* than it should be, and below par on *probativeness*

As the title of this abstract indicates, I will offer the proposition or conjecture that the childhood intervention literature relating to efficacy is both more trusted than it merits being, and yet less trusted than we would wish it to be if it were truly trustworthy. I will further argue that it is unreasonably low on trustworthiness and unreasonably low on probativeness, by which I mean the extent to which it contains studies which have the ability to meaningfully move the needle of knowledge forward in an important way. I will then offer evidence, some anecdotal, some more quantitative, to support these conjectures or propositions. I will provide examples of situations in which evidence has been distorted, exaggerated, or just presented in mistaken and invalid fashion.

I will offer suggestions for how the field might be bettered. Emphasis will be placed on the conduct of intervention studies for efficacy or effectiveness whether those intervention studies involve prevention or treatment. I will point out errors which occur in all phases of research ranging from identification of premises on which subsequent studies are predicated, formulation of questions, design of studies, execution of studies, analysis of studies, and interpretation and communication of studies in their results.

I will conclude by indicating that there is much work that needs to be done to have a literature on childhood obesity intervention studies, particularly in the community and school settings. (i.e., in nonclinical settings) and that our society at large, our funders, and most especially our children deserve better. A focus on some of the most common failings, particularly around design and analysis of studies will be provided. On that basis, I will argue that not only is there great value in producing better studies that reduce mistakes at all levels of the processes described above, but that systematic efforts to “clean up” the existing literature and thereby subtract false knowledge plays an important and vital role science. However uncomfortable ‘subtracting’ false knowledge through corrections and retractions may make some people, is something that should be done, should be done more, and should be supported both with facilitative actions by parties such as editors and funders and by material support from funders to execute the tasks. Through all of this, we can do better science, stay true to our role as truth seekers and truth communicators, and do better for the health of our children.

Notes

Baur, Louise Alison

Chair of Child & Adolescent Health
The University of Sydney
Australia

Co-author:
Carolyn Summerbell

Where do we go from here? What is the future for prevention of obesity in children and adolescents?

Obesity prevention is challenging because it requires a multi-level, multi-sectoral approach that addresses inequity, involves many stakeholders and addresses both the up-stream as well as down-stream factors influencing obesity risk. Some evidence exists of effectiveness of prevention interventions operating at the programmatic level of the child, family and school. However, the very poor progress overall in modifying obesity prevalence globally highlights many areas in need of research and evidence implementation.

Studies are needed especially in LMICs, particularly in the context of the nutrition transition and the double burden of malnutrition. A focus on intergenerational research, rather than the age-based focus of current work, is also needed. Systems research approaches should be used, addressing the broader food and physical activity environments, and links to climate change, structural racism and the drivers of poverty. In all studies, strategies are needed that enable co-production with relevant communities, especially Indigenous peoples, long-term follow-up, process evaluation and cost-effectiveness analyses. In the next few years, research and practice priorities must include a focus on intervention strategies in the earliest phases of life, including during pregnancy. The effects of COVID and cost of living crises in many countries are leading to widening health inequalities and this will further challenge obesity prevention interventions. Available resourcing for prevention interventions may become further constrained, requiring innovative solutions across cross-sectoral agendas with limited resources Ultimately, to implement obesity prevention, societal changes are needed in terms of urban planning, social structures and healthcare access.

Future high-quality paediatric obesity research can be enabled through strategies that support data sharing, which avoids research waste and bias and enables new research questions to be addressed. Such approaches require leadership, careful engagement of multiple research teams, patience when dealing with institutional research ethics committees, and resourcing. One data sharing approach is through individual participant data meta-analyses of intervention trials, which can include prospectively collected data and are quite distinct from systematic reviews of aggregate data. Examples include the Early Prevention of Obesity in Childhood (EPOCH) Collaboration (Australia & New Zealand focussed), and the related Transforming Obesity Prevention in CHILDhood (TOPCHILD) Collaboration (global), both of which include early interventions to prevent obesity in the first 2 years of life. Formal data linkage studies, especially those joining up routine administrative datasets, enable longer-term and broader outcome measures to be assessed.

Collaborative research will also be enhanced through using agreed core outcome sets that support data harmonisation. A core outcome set for early intervention trials to prevent obesity in childhood (COS-EPOCH) has been recently established. These efforts incorporate a balance between supporting data sharing while adhering to privacy protection regulations. Objective end points are ideal, including directly measured physical activity and body composition.

Collaborative efforts and a systems approach are vital in order to understand, prevent and manage child and adolescent obesity. Research funding and health policies should focus on feasible, effective, and equitable interventions.

Notes

Catalano, Patrick

Professor
Tufts University School of Medine
United States

The Lifestyle Intervention in Preparation for Pregnancy (LIPP) Study

There has been a significant increase in the prevalence of childhood and adolescent obesity in the United States affecting approximately 20 percent of children (CDC). Lifestyle interventions to treat childhood obesity have had limited success. In 2023 the American Academy of Pediatrics recommends consideration of pharmacotherapy for patients age 12 or older with a BMI at or above the 95 percentile and bariatric surgery for patients age 13 years or older whose BMI is 120% or more than the 95th percentile as options. Based on the DOHaD hypothesis the in-utero environment may play an important time in development related to childhood and adult risk of obesity and related metabolic dysfunction. Based on the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) study and HAPO Follow up Study, while gestational diabetes (GDM) is an independent risk factor for childhood obesity higher BMI in pregnancy accounts for more of the variance in childhood obesity.

Lifestyle interventions during pregnancy have had limited success if decreasing excessive gestational weight gain; based on various meta-analyses 1-2 kg. but have not improved perinatal outcomes specifically excessive fetal growth or adiposity. In 2018 we began the Lifestyle Intervention in Preparation for Pregnancy (LIPP) Study to improve metabolic condition of women who were either overweight or class I obese in their most recent pregnancy. The long-term goal is to improve metabolic conditioning of the mother prior to a subsequent pregnancy with the goal of decreasing neonatal adiposity. The pre-pregnancy lifestyle aspect of the study should be completed in late 2023. The follow up of the subsequent pregnancies in 2024.

Notes

Epstein, Leonard

Distinguished Professor
Jacobs School of Medicine and Biomedical Sciences, University at Buffalo
United States

Family-based interventions to treat and prevent obesity across generations

Obesity runs in families, as children with obesity are likely to have parents and siblings with obesity. In addition, cardiometabolic effects of obesity also run in families, as the risk for diabetes, hypertension and dyslipidemia are greater for children if their parents have these diseases. Given that parents model eating and activity patterns for their children, and they set up a shared family eating and activity environment for themselves and other family members, we developed family-based treatments for primary and secondary prevention of obesity in youth. Family-based treatment focuses on teaching children and their parents a healthier lifestyle to learn new habits that can treat obesity in the parents, and prevent children from becoming obese during childhood (primary prevention) and prevent children who are obese in childhood from becoming obese in adulthood (secondary prevention). There are over 25 randomized, controlled studies on family-based testament that shows significant treatment effects at the end of treatment for both 6-12 year-old children and their parents with obesity, and these effects have been maintained over a 10-year follow-up until the children are 16-22 years of age. In addition, a highly significant relationship has been observed between child and parent change during treatment that persists through 5-year follow-up. In addition to changes in the targeted child and parent, we have also shown that siblings, who are not treated, also change their degree of percent overweight, and their changes are related to changes for the targeted sibling. Given that having parents with obesity increases the risk of a child becoming obese, we have shown that as parents with obesity show changes in weight and eating habits, and these changes generalize to children at risk for developing obesity. The simultaneous treatment of parents and children with obesity using family-based treatment is more cost-effective than treating the child by their pediatrician, and the parents by their primary care doctor.

Family-based treatment includes the Traffic Light Diet and Activity Program and positive parenting. Treatment is typically provided in group formats, which is more cost-effective than individual treatment. Parents and children are seen in separate groups, to ensure that the child learns to take responsibility for their behavior change while the parent is learning how to change their eating and activity behaviors, and learn positive parenting. Family-based treatment has shown the importance of focusing on healthy eating, rather than just what a child and parent should eat less; the importance of lifestyle exercise, rather than traditional aerobic exercise; the importance of reducing sedentary behavior to foster less eating and greater physical activity; the impact of dose on treatment outcome, and the role of social facilitation. The treatment is adapted for different aged children based on their cognitive and self-control abilities, with treatment for younger children parent focused, with a shift to children taking more responsibility as they get older. The treatment has been revised to deliver family-based treatment using guided self-help, which requires less therapist time with no decrement in treatment outcomes.

New ideas to adapt family-based treatment for primary prevention by combining treatment of parents with obesity and their children at risk for obesity will be discussed, including the importance of developing alternative reinforcers to food, train people to focus on long term goals rather than immediate gratification, modifying the shared family environment and reducing variety of high energy dense, low energy dense foods.

Notes

Felix, Janine

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Genetics of childhood obesity

There is increasing knowledge on the genetic architecture of childhood obesity – from rare penetrant mutations to common polygenic contributions. This knowledge, which has been based on life course studies with rich longitudinal data, can give us a better understanding of the biological factors that underlie the development of childhood obesity. In turn, this may be a starting point for prevention or intervention measures.

This presentation will discuss the current knowledge of the genetic contributions to childhood adiposity from birth onwards – in a life course perspective. This will naturally lend to comment on the mechanistic clues that follow on from reliable associations, what we are learning from this in relation to environmental factors and together how this informs our understanding of aetiology and the underpinnings of a growing collection of effective interventions.

Notes

Flint, Stuart W

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Pervasiveness, impact and implications weight stigma and discrimination experienced by children and young people living with obesity; why we need to act!

Weight stigma and discrimination is pervasive and is experienced by people of all ages and backgrounds. Amongst children and young people, weight stigma has increased overtime, with experiences associated with physical and psychological health decrements that can have lifelong consequences.

In addressing this issue, Dr Flint will discuss the 1) sources that lead to the formation of stigmatising attitudes, 2) experiences and types of stigma and discrimination that children and young people experience, and 3) impact and implications of stigma and discrimination both for children and young people as well as wider society.

In doing so, Dr Flint will highlight why interventions to eradicate weight stigma and discrimination are warranted as well as possible avenues for collective action.

Notes

Gerhart-Hines, Zachary

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Denmark

A novel target for the treatment of obesity and diabetes

The past few years have produced extraordinary advances in obesity pharmacotherapy. However, several key gaps in treatment remain. There are still concerns surrounding loss of lean mass, weight regain, durability, and tolerance. But one of the biggest needs remains a safe means of increasing metabolic rate. All current approved drug therapies to date only suppress appetite. Simultaneously reducing food intake while boosting energy expenditure represents a powerful strategy for the next generation of therapeutics to counteracting obesity and type 2 diabetes (T2D). However, current approaches require combining different receptor agonists to both decrease energy intake and promote oxidative metabolism. Here we show that activation of the Neurokinin 2 Receptor (NK2R) is sufficient to dually suppress appetite via the central nervous system and increase energy expenditure and insulin sensitivity in the periphery. We identified NK2R in an unbiased genetic analysis due to its significant association with HbA1c levels and obesity. Yet assessing the therapeutic potential of NK2R signaling has long been hindered because its endogenous ligand, Neurokinin A (NKA), lacks receptor specificity and has a markedly short half-life. Therefore, we engineered highly selective, long-acting NK2R agonists with the capacity for up to once-weekly administration in humans. NK2R activation induces energy expenditure and reduces food intake and body weight in both diet-induced and genetic rodent models of obesity. Moreover, hyperinsulinemic-euglycemic clamp studies show that NK2R agonists act as potent insulin sensitizers. In diabetic, obese nonhuman primates, NK2R agonism decreases food intake, body weight, triglycerides, glucose, and cholesterol, and corrects insulin resistance, without nausea or adverse cardiovascular effects. These results define a conserved role of NK2R agonism to improve systemic energy homeostasis and reveal a single receptor that can both leverage energy-expending and appetite-suppressing programs to counteract obesity and T2D.

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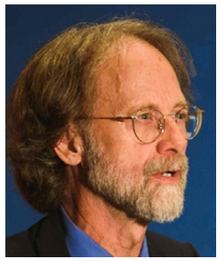

Gortmaker, Steven L

Professor of the Practice of Health Sociology
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United States

Interventions that can cost effectively prevent obesity and chronic disease and improve health equity

Obesity prevalence continues to increase in countries throughout the world, along with often widening socioeconomic disparities. In the US we observe the continued impact of social and commercial determinants of health and structural racism. Nutrition and physical activity interventions in childhood that are effective at preventing obesity and feasible to implement have attracted attention. Decision makers are particularly interested in strategies that improve population health as well as health equity, and that produce the best health outcomes for the resources expended.

In this session, I discuss how our CHOICES team (Childhood Obesity Intervention Cost Effectiveness Study) has evaluated a broad range of strategies for their impact on the prevention of obesity, overall population health, health equity, and cost-effectiveness. Metrics for effectively communicating health related outcomes and health equity are highlighted. Interventions include those already effectively implemented in the US: the WIC food package change (2009), implementation of the Healthy, Hunger-Free Kids Act (HHFKA) (2012), implementation of nationwide calorie labeling in fast food locations (2018), and sugary drink excise taxes. I discuss our learning collaborative partnership work with 21 state and city health departments and their community partners, and our CHOICES Community of Practice.

Results indicate two different pathways that can lead to success at cost-effectively improving overall population health and health equity. Our results also highlight the particularly important role of limiting unhealthy foods and beverages in children's environments.

Notes

Heitmann, Berit Lilienthal

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Primary prevention of childhood obesity – is it possible?

Primary prevention of overweight and obesity aims at decreasing the number of new cases becoming overweight, thus targets the healthy weight individual; secondary prevention lowers the rate of established cases – thus treats overweight and obesity, while tertiary prevention stabilizes or reduces the co-morbidity associated with obesity.

Over the past 2-3 decades several hundred RCTs have been conducted aimed at preventing overweight and obesity among children, however except for one study all previous interventions targeted groups of children where some had healthy weight but up to 50% already had established overweight or obesity. While some of these interventions were found to be effective, it still remains unknown if they prevented the development of overweight among healthy weight children or resulted in weight loss among children with already established overweight.

A few secondary analyses from some of the interventions suggest the latter – e.g. that only children with overweight benefited from the intervention by losing weight without having been specifically targeted.

This presentation will discuss the current evidence for effects of primary overweight and obesity prevention interventions among children.

Notes

Hemmingsson, Erik

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Psychosocial causes of childhood obesity

There is compelling evidence linking the development of childhood obesity with psychological and emotional distress, mainly driven by social adversity in the family (poverty and financial strain, parents having a low education, a low social position, mental health problems and relationship discord; offspring being exposed to gestational stress, unmet social and emotional needs, food insecurity, maltreatment and abuse). Common forms of psychological and emotional distress include having a low self-esteem and self-worth, negative emotions, negative self-belief, powerlessness, insecurity, depression and anxiety.

Psychological distress, when coupled with a genetic predisposition to obesity, in turn promote mainly stress-mediated pathways to obesity, including a hyperactivated HPA-axis and sympathetic nervous system, increased cortisol, appetite up-regulation, and disruptions in energy homeostasis. Over time, this results in weight gain and obesity, in turn eliciting weight stigma and further psychosocial distress, increasing the likelihood of further obesity development and transmission of obesity from parents to offspring.

Notes

Lobstein, Tim

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Global challenges to child obesity prevention

Recent projections suggest over 300m of the world's children and adolescents – around one child in every seven - will be experiencing obesity in 2030, more than double the number (132m) estimated in 2017. The majority of these children will remain at risk of overweight and obesity into adulthood. The economic impact of overweight and obesity among children and adults is estimated at some US$ 2 trillion in 2020, rising to over US$ 3 trillion by 2030, and US$ 4 trillion by 2035. These are the economic costs of inaction, equivalent to nearly 3% of global gross domestic product, and they take no account of many of the consequential co-morbidities of high BMI, or the possible rise in obesity prevalence in children due to the COVID-19 'lockdown' restrictions.

The most rapid increases are being seen in low- and middle-income countries, where the capacity to provide weight management services for these children, or to treat obesity in adulthood arising from this increase, is limited, and therefore the need for prevention programs is especially acute.

Interventions to prevent obesity developing in childhood take several forms: the classical community intervention with families and schools, using quasi randomised controlled trials, and the ecological approach based on understanding of the social and commercial determinants of health and health inequalities. For the former, several Cochrane reviews of childhood and adolescence obesity prevention initiatives have summarised the evidence. The most common setting for controlled intervention studies are in developed economies, and located in schools, where specific inputs can be measured and the experimental designs can ensure validity for the results. However, this focus on the school creates a strong 'settings bias' in the scientific evidence, restricting the range of evidence available to policy makers, and leading to concerns that 'evidence-based policy' is too narrow in its focus. The Cochrane analyses suggest that the typical intervention is likely to achieve only limited results, and the equity and sustainability of the effects are not well-established.

In contrast, the 2016 WHO Commission on Childhood Obesity and subsequent national and international expert consultations have all recommended measures to prevent overweight and obesity at a population level in order to tackle the social and economic determinants of dietary patterns and physical activity. Regulatory approaches — such as controls on promotional marketing to children, taxes on sugar-sweetened beverages or mandatory front-of-pack nutritional food labels — have been introduced in several countries. Studies which have assessed the likely cost-effectiveness, equity and acceptability of different types of intervention have generally supported these ecological approaches and strengthened the argument for systems-based rather than piecemeal policy development.

Finally, there are some current issues that have policy implications and need further discussion. One is the impact on obesity prevalence of the Covid-19 lockdown and post-lockdown period, a second is the support needed to assist smaller under-developed economies facing rapid increases in child (and adult) obesity, a third is the impact of social media on children's mental health and diet-related behaviour, and a fourth is the increasing evidence for the role of environmental endocrine disrupting chemicals which may be responsible for a greater proportion of the obesity epidemic in children than previously appreciated.

Notes

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Why do parents with obesity more often have children with obesity?

Obesity is a major chronic disease, posing an enormous burden on people's health, and on societies as a whole. The prevalence of obesity among adults has more than tripled since 1975, and particularly alarming is the global rise in obesity among children and adolescents. While fewer than 1% of children and adolescents had obesity in 1975, more than 7% of boys and girls had obesity in 2016.

The relationship between adult and childhood obesity presents as a vicious circle. Compared to children whose parents are of normal weight, children whose parents have obesity are more likely to have obesity or be overweight themselves. Furthermore, children with obesity are more likely to become adults with obesity, compared to children with normal weight. The prevention of childhood obesity requires a profound understanding of the intricate relationship between adult and childhood obesity, which is the result of both a shared environment and a shared genetic background.

In my presentation, I will focus on the genetic underpinning of childhood obesity as compared to obesity in adulthood. Twin and family studies have shown that the heritability of obesity, which ranges between 40 and 70%, increases during childhood and adolescence, reaches a maximum in young adulthood, and finally decreases as people grow older.

Large-scale genome-wide association studies (GWAS) have identified more than 1,700 genetic loci robustly associated with adiposity traits, in particular with body mass index (BMI). Even though the vast majority of these BMI-associated loci were first identified in adults, they are also associated with adiposity traits in childhood and adolescence. Tissue enrichment and pathway analyses for BMI-associated loci have pointed towards the central nervous system (CNS) to play a key role in body weight regulation, likely through controlling the hedonic aspects of food intake (such as reward, hunger, and satiety). The high genetic correlation between childhood and adulthood BMI ($r>0.75$) suggests that the biology underlying adulthood and childhood obesity is largely similar, a contrast to the much lower genetic correlation between childhood BMI and birth weight ($r\sim0.20$). Despite the high genetic correlations between childhood and adulthood GWASs, there is growing evidence that some loci have age-specific effects; i.e. some loci have a greater impact early on in life, whereas others affect body weight later in life.

In GWAS, BMI has almost always been studied in a cross-sectional manner, in adults, children, and adolescents alike. However, cross-sectional BMI does not inform us about the BMI trajectory throughout the course of a person's life; i.e. when and how fast weight was gained (or lost). There is strong evidence that rapid weight gain during infancy and early childhood are important risk factors for future adult obesity. So far, very few loci have been identified for early growth traits; some of which overlap with those identified for cross-sectional BMI, whereas others, such as variants in LEPR, associate with peak BMI during infancy, and point to a distinct genetic make-up.

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Genetic risk scores, which aggregate the effects of BMI-associated variants to represent people's genetic susceptibility to obesity, are associated with BMI throughout the course of a person's life, but their effects increase throughout childhood and adolescence to reach a maximum effect in young adulthood, after which effects decrease again into late adulthood. GRSs are used to predict risk of future obesity and their performance is age-specific; i.e. to predict adult obesity, GRSs based on adult BMI GWAS perform best, whereas to GRSs based on childhood BMI perform best to predict childhood obesity.

Taken together, insight in the genetic basis of childhood obesity may contribute to understanding the underlying biology that influences early weight gain and growth. Genetic insights may also help identify individuals most at risk of gaining weight during childhood. These at-risk individuals may benefit from targeted preventive strategies during this critical window of growth and maturation.

Notes

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The carbohydrate-insulin model: A physiological perspective on the obesity pandemic

Conventional treatment for obesity, founded on the first law of thermodynamics, assumes that all calories are alike, and that to lose weight one must ultimately "eat less and move more." However, this prescription rarely succeeds over the long term. Calorie restriction elicits predictable biological responses – including increased hunger and reduced energy expenditure – that oppose ongoing weight loss. Indeed, the prevailing 'energy balance model' offers no compelling explanation for what environmental factors have so profoundly altered the biological systems that control body weight. Why has average body mass index increased so rapidly among populations worldwide with relatively stable genetic obesity risk?

The 'carbohydrate-insulin model' proposes a reversal in causal direction: overeating doesn't drive body fat increase over the long term; instead, the process of storing excess body fat drives overeating. High intakes of processed carbohydrate raise the insulin-to-glucagon ratio and elicit other hormonal responses that shift energy partitioning toward storage in adipose, leaving fewer calories available for metabolically active and fuel sensing tissues. Consequently, hunger increases. and metabolic rate slows in the body's attempt to conserve energy. A small shift in substrate partitioning favoring fat storage, as hypothesized by this model (10 – 20 kcal/d average), would account for the slow but progressive weight gain characteristic of common forms of obesity.

From this perspective, the conventional calorie-restricted, low-fat diet amounts to symptomatic treatment, destined to fail for most people because it does not target the underlying predisposition toward excess fat deposition. A dietary strategy aiming to lower insulin secretion may increase the effectiveness of long-term weight management and chronic disease prevention.

Notes

Martin, Jane

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Food for Health Alliance
Australia

How do we accelerate progress in prevention of childhood obesity?

Prevention of childhood obesity is of global concern and to date there has been limited success in slowing and/or reducing rates of overweight and obesity in children. For many low- and middle-income countries they face the dual issues of under and overnutrition in children, driven by the nutrition transition promoting cheap, available, heavily promoted ultra-processed food.

Many of the levers to prevent childhood obesity sit with government, that is to ameliorate the structural issues in society that exacerbate poor diets in children, as well as tempering the activities of commercial actors who profit from the production, sale and promotion of ultra-processed foods.

This presentation will discuss the barriers to action by government and some potential strategies to accelerate action to address and prevent childhood obesity. This includes the role of advocacy, partnerships; communication and framing – including mass media campaigns; and research and evidence.

Notes

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How are we progressing with whole systems approaches to obesity prevention?

Aims: This research aims to: (i) reflect on the current evidence base around obesity prevention, (ii) determine how local governments in England seek to prevent obesity, (iii) summarise the published evidence on systems approaches to obesity prevention, and (iv) outline several avenues to strengthen such approaches in the future.

Methods: (i) A secondary analysis of the 153 studies included the most recent Cochrane Review, "Interventions for Preventing Obesity in Children", was completed. The foci of the included interventions were coded and then analysed against the Wider Determinants of Health (WDoH) model. (ii) Intervention data from 10 local governments in England was collected and analysed against the WDoH model. (iii & iv) A rapid scoping review of the evidence synthesis literature was undertaken to examine the use of systems approaches in public health contexts.

Results: The current evidence base around obesity prevention is skewed towards intervention at the individual behaviour change level. The same pattern is mirrored by local governments when seeking to prevent obesity.

Published evidence on systems approaches is growing, but there are several significant limitations which challenge the synthesis of findings. Future work should define and explain what is meant by a systems approach so that it is more feasible to synthesise evidence and develop meaningful conclusions.

Conclusion: There is an urgent need to systematically appraise how systems approaches are currently being applied, how they are being evaluated, and whether they are valuable. The opportunity cost of not understanding the current landscape is too great to overlook, and there is a real risk that ill-informed decisions about their perceived effectiveness and utility are made.

Notes

Ong, Ken

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How does genetics inform the prevention of childhood obesity?

Large-scale genome-wide association studies (GWAS) have identified several hundreds of independent common variants associated with body mass index (BMI). The vast majority of such studies have been for BMI in adults. By contrast, studies for childhood BMI or childhood obesity are substantially smaller. Regardless of this imbalance at the GWAS discovery stage, the genetic variants for adult BMI in combination are consistently reported to have significant effects on childhood BMI and adiposity. Indeed, in terms of longitudinal weight gain, childhood appears to be the period of life during which adult BMI GWAS signals have their greatest influence on the development of overweight and obesity. In light of this context, the mechanisms identified by GWAS for adult BMI have direct relevance to childhood weight gain and obesity risk. Polygenic risk scores for BMI may not yet add meaningfully to the prediction of individuals at high risk for later obesity. However, the following points consider how genetic understanding may inform interventions to prevent childhood obesity:

Which population? Studies of adult BMI polygenic risk scores indicate that the trajectory to high adult BMI starts with rapid weight gain during infancy, even during the first few weeks of life, leading to higher childhood BMI emerging from around age 4-5 years old. This supports the growing interest in early life interventions, even from infancy, to change early weight trajectories before overweight appears.

In addition to anthropometric traits, behavioural studies have characterized the likely effects of genetic susceptibility to obesity on appetitive traits (e.g. appetite, food responsiveness, satiety) typically measured by self- or parent-reported 'eating behaviour questionnaires'. It is tempting to suggest that combining appetitive traits with anthropometry may more accurately predict those children at high risk of obesity. However, as yet there are insufficient normative data on appetitive traits to confidently identify which scores are unusually high.

Which intervention? Understanding the mechanisms associated with genetic susceptibility to obesity (i.e. higher appetite, lower satiety and higher caloric intake) may inform intervention targets. While highly effective pharmacological interventions to reduce appetite are emerging, certain behavioural intervention approaches may also be effective and are more appropriate for prevention (as opposed to treatment of individuals with severe obesity and significant comorbidities).

Acceptance and Commitment Therapy (ACT) is a form of behavioural intervention which shows promise in achieving and sustaining weight loss in adults. ACT explicitly acknowledges the hunger urges experienced by many individuals, and aims to change overeating in response to internal and external cues.

For infants and young children, parental strategies based on Responsive Feeding follow a similar concept to ACT, by teaching and encouraging parents to recognize and respond to hunger and satiety cues. The BabyMilk RCT showed that an intervention using a

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Responsive Feeding approach had overall efficacy in reducing overfeeding and weight gain in formula fed infants. Furthermore, an unpublished secondary analysis shows that the intervention was even more effective in reducing formula milk intakes among infants with lower satiety scores.

Which outcomes? While BMI and adiposity are obvious outcomes, genetic epidemiology studies provide some additional insights. Growth in height (length) during the first 1-2 years of life is particularly sensitive to nutrition. Infants who are overfed, or who have high polygenic risk scores for adult BMI, show rapid growth in length and lean body mass alongside rapid gains in fat mass and overall body mass. Accordingly, parameters of adiposity relative to height or lean mass (e.g. BMI, percent body fat) as less sensitive indicators of overnutrition during this period.

Children who are overfed, or who have high polygenic risk scores for adult BMI, tend to remain taller until they reach relatively early puberty, when their early cessation of height growth results in a neutral effect on adult height. Hence tall childhood stature (i.e. taller than predicted by parental heights) and earlier timing of pubertal maturation are part of the life-course trajectory to obesity.

Notes

Reilly, John Joseph

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Health consequences of child and adolescent obesity

The presentation will begin by reviewing systematic reviews on the health consequences of paediatric obesity. In the past 20 years a number of systematic reviews/meta-analyses have established that obesity during childhood and adolescence has a wide range of adverse consequences. These include substantial impacts on both physical and mental health, and both short-term consequences (during childhood and adolescence) and longer-term (during adulthood). As in adulthood, child and adolescent obesity disrupts a number of biological systems. Paediatric obesity also has adverse consequences for health behaviours (notably physical activity and sedentary behaviour) and other health related outcomes like motor competence and physical fitness. Evidence on novel co-morbidities of paediatric obesity continues to emerge, and in recent years has tended to focus on co-morbidities during early childhood, and impacts of obesity on brain structure and function. Some of these more recently identified co-morbidities will be discussed.

The motivation for the first systematic review on the co-morbidities of childhood and adolescent obesity, in 2003 in Scotland, was to test the hypothesis that obesity had adverse consequences. Establishing adverse consequences was considered as necessary to encourage and enable health policymakers and health professionals in Scotland to take action on paediatric obesity. Evidence that a paediatric obesity epidemic had occurred in the UK was available by the end of the 1990's but there was a great deal of uncertainty over what the clinical and public health responses to the epidemic should be. The understanding and awareness that paediatric obesity has a number of co-morbidities provided impetus for increasing efforts at childhood and adolescent obesity prevention and treatment. However, a 20 year history of well-established adverse consequences does not mean that paediatric obesity is taken as seriously as many of us had hoped at the time, and health policy and practice is influenced by many factors other than the scientific evidence.

In recent years the public health message that paediatric obesity has adverse health consequences has become increasingly difficult to convey clearly, effectively, and sensitively. Messaging has been seen by some as individualizing the problem or even victim blaming, and failing to recognize that obesity is a socio-ecological problem. The concept that excess body fat matters has even been challenged in public discourse- the view that body fatness does not matter to health but lifestyle is what matters to health is expressed commonly in mass media. Improved knowledge exchange on the health consequences of obesity should help, and the presentation will touch on new research and knowledge exchange which could improve the way mass media frames obesity and its health consequences.

While many co-morbidities of paediatric obesity have been identified, the evidence base is complex and there are a number of barriers to a more complete understanding of the range and magnitude of co-morbidities. These include variation in the definition of obesity used between studies, the reliance on limited measures and definitions of obesity, the possibility that co-morbidities vary between human populations, and bi-directionality. A number of improvements to design and methodology of studies will be suggested so that the evidence base on the health consequences of paediatric obesity improves in future.

Notes

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Co-author:
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Early nutrition and adiposity rebound

After a rapid increase up to the year 2000, childhood obesity stabilized, but the prevalence remains high in many countries. Trends in nutritional intakes hardly explain this epidemic since there was no clear evidence of increasing energy intake as obesity prevalence increased. The role of nutrition in early life may explain this paradox. There is now increasing evidence that early life environment has a long-term effect on health in adulthood ("the first 1000 days").

The importance of early life can be seen through growth trajectories. While body weight increases regularly with age, body fatness assessed directly (skinfolds) or evaluated by the Body Mass Index (BMI) follows a different pattern. Body fatness increases during infancy, then falls and subsequently starts increasing again. The BMI increase starting from the age at the nadir of the curve was named the "Adiposity Rebound" (AR). It was observed that the earlier the AR the higher the subsequent body fatness level.

The early AR recorded in most children with obesity suggests that environmental factors may have operated in early childhood. Particularly the composition of the diet during the first years of life may have played a role.

By contrast with the high fat low protein content of human milk, the diet of young children in many industrialized countries is characterized by a low proportion of fat and high amounts of protein. This nutrient imbalance contrasts with the official recommendations that fat intake should not be restricted before the age of 3 years. Hypotheses are proposed to explain the mechanisms involved in the association between imbalanced diet and the risk of obesity. In particular, a low-fat diet in early life may program adaptive metabolism ("thrifty metabolism") that can become detrimental when environmental conditions will change ("mismatch"). Besides, high protein intake was found to be associated with an early AR reflecting accelerated growth. This is consistent with the early rebound and rapid growth characteristics of childhood obesity.

These observations stress the importance of providing nutritional intakes adapted to nutritional needs at the various stages of growth and suggest various hypotheses about the mechanisms involved in the development of obesity and metabolic diseases.

Reference:

Rolland-Cachera MF, Deheeger M, Bellisle F et al. Adiposity rebound in children: a simple indicator for predicting obesity. AJCN 1984; Rolland-Cachera MF, Akrout M, Péneau S. Nutrient Intakes in Early Life and Risk of Obesity. *Int J Environ Res Public Health.* 2016

Notes

Seidell, Jacob (Jaap) C

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Prevention of childhood obesity in The Netherlands

Background: As in many other countries around the world, the Netherlands has a high prevalence of overweight and obesity in children. About 1 in 7 of children aged 2-19 years has either overweight or obesity.

Summary: In this paper the national and local activities aimed at the prevention and management of obesity in children and adolescents in the Netherlands are reviewed. It is recommended to, nationally as well as locally, take an integrated-systems approach that tackles the obesogenic food environment as well as upstream and downstream determinants of obesity. Efforts should take a life course approach and be focused on promoting obesity prevention as well as improving the management of children who already have obesity.

The national policies in the Netherlands rely heavily on self-regulation by stakeholders such as supermarkets, restaurants, and the food industry. Local policies and actions such as the whole-systems approach in Amsterdam are promising. Future directions include development of tools for the operationalization and evaluation of local systems approaches. Regulation by national and local governments is necessary to ensure a healthy food environment for children and their families, but health policies require intersectoral action.

Key Messages: In the Netherlands many policies are in place or under development, especially at the municipal level (e.g., in Amsterdam), but more substantial action is urgently required.

Notes

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Protein leverage in childhood obesity

Recent analysis of the causal structure of childhood obesity has indicated that diet is both proximately linked to childhood obesity and is part of a more fundamental on-ramp mediated via parental effects, including parental socioeconomic status and biological pathways (Zhu et al., 2023). In the presentation we show how protein leverage theory, which derives from nutritional ecology, provides an integrating framework for explaining the links between diet and childhood obesity and offers points of intervention that could alleviate the problem.

Protein leverage theory describes the way in which a powerful nutrient-specific appetite for protein drives increased energy intake when protein is diluted in the diet by non-protein energy (notably fats and carbohydrates), as is especially apparent for highly industrially processed diets. We begin by explaining the theory of protein leverage and briefly survey the body of supporting evidence, spanning mechanistic, comparative, experimental and population studies. We also show how an increase in protein requirements (“target”) relative to non-protein energy needs will increase the risk of energy overconsumption.

Next, we consider evidence from population studies that protein leverage is evident in children and in mothers during pregnancy. Then we show cohort data indicating that maternal macronutrient and energy intakes translate into neonate adiposity and fat distribution. Data from formula feeding studies are introduced to hypothesize that excess protein in the maternal diet during pregnancy and early life exposure to a higher than optimal protein diet may increase the protein target and thereby increase susceptibility to childhood obesity through protein leverage. We present data from experiments in mice which support this hypothesis. Finally, we introduce the possibility for paternal effects mediated through sperm epigenetics, illustrated by data from mouse studies.

In conclusion, protein leverage theory provides a powerfully integrating framework for defining the complex network of interactions leading to childhood obesity and for identifying societal and dietary interventions to tackle the problem.

Notes

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Evidence from trials of interventions to prevent childhood obesity: What is most likely to decrease health inequalities and why?

Health inequalities in childhood obesity is rising. Local and national governments, and other stakeholders responsible for the promotion of health and life chances for all children, need to know where best to target their limited (and often shrinking) resources in tackling this problem.

Downstream intervention (within the individual and interpersonal domains of the socio-ecological model (SEM)) and high-agency interventions (on the bottom steps of the Nuffield intervention ladder) are theoretically more likely to result in intervention-generated inequalities. This has been elegantly described and evidenced, with some examples from the obesity prevention literature, by a number of researchers. This presentation will describe analysis which attempts to assess whether data from interventions included in a number of Cochrane reviews support this theory.

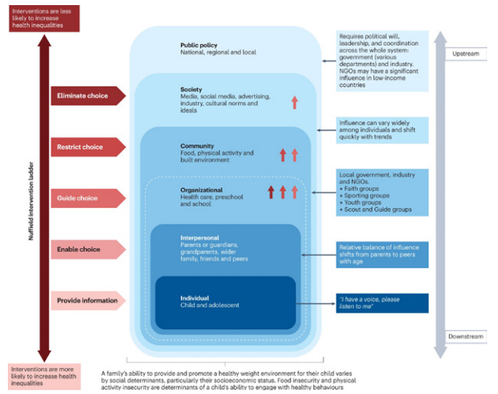
Using data from the 153 trials included in the Cochrane systematic review of interventions to prevent childhood obesity (2019), interventions have been mapped onto the Figure below (Lister et al, Nature Primer Reviews, 2023).

Within each of the domains of the SEM, different shades of dark orange are used to show interventions which guide (light), restrict (medium) or eliminate (dark) choice as defined by the Nuffield intervention ladder. The only dark orange arrow in the Figure represents a number of school-based interventions.

Although most trials included in this Cochrane review collected and reported data at baseline on one of more PROGRESS factor (Place, Race, Occupation, Gender, Religion, Education, Socio-economic status, Social status), very few (11) reported the impact of socio-economic status on the effectiveness of the intervention.

We are currently updating this Cochrane review and, in the process, have divided it into four different reviews by age group. There are at least twice as many studies in each age group in the update reviews. This presentation will include the updated data for one or more of the age groups (in the same format as the Fig. in this abstract). A summary will be presented of the relative impact of socio-economic status on the effectiveness of interventions by where they sit on the SEM and Nuffield Intervention Ladder.

Recommendations will be provided on where best to target public health interventions to prevent childhood obesity whilst also minimising/reducing health inequalities.



Notes

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Move, eat, sleep, repeat: Should we be focusing more on sleep as the answer to child obesity?

The cornerstones of weight management have always been diet and physical activity.

More recently sedentary time, as a concept distinct from physical activity, has received a lot of research and media attention. But what about sleep? Should we be focusing more on the role that good sleep health plays in ensuring effective weight management in children?

After all, the observational evidence linking short sleep to an increased risk of obesity in children is strong and very consistent.

This presentation will discuss the evidence linking sleep to body weight in children, focusing on the experimental evidence where possible. It will include topics such as:

1. Do sleep interventions reduce obesity risk in children?
2. How does not getting enough sleep impact diet and activity?
3. Do digital media really impact sleep?
4. What should we be recommending?

Notes

Tremblay, Mark

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The importance of movement behaviors for healthy child development and obesity prevention

Our changing world is changing us, in few ways more evident than how we move. At an individual level, we are sleeping less, sitting more, walking infrequently, driving regularly, getting less physical activity, and spending less time outdoors. We are moving from rural to urban areas, from outdoors to indoors, from standing to sitting, from walking to driving, from active play to digital play, from three dimensional to two dimensional interactions, and these rapid transitions are challenging our brains and bodies – our mental and physical health, including obesity. And our children are caught in this vortex of unhealthy movement behaviors. Related, a new 24-hour movement paradigm is being adopted, recognizing that physical activity, sedentary behavior and sleep – the only and mutually exclusive movement behaviors – must be viewed as an integrated entity to best understand their relationship with indicators of health, including adiposity.

This presentation will provide healthy 24-hour movement behavior recommendations, explain how they improve upon isolated individual behavior approaches, describe their relationship with indicators of adiposity and healthy development, and suggest how a new "movement index" approach may substantial improve prevention, management and treatment opportunities for children at-risk or struggling with obesity.

Notes

Index of abstracts by author name

Notes

001 | **Abraham, Sarah**

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Development of a health economics logic model to evaluate the role of UK school-based feeding interventions in mitigating the harmful impact of household food insecurity on childhood obesity

Household food insecurity (HHFI) is a complex public health concern and is associated with childhood obesity. Diet plays a key mechanistic role between HHFI and childhood obesity, which is disproportionally present in children experiencing HHFI, who are typically from disadvantaged households. UK school-based feeding interventions aim to improve children's diet, often targeting disadvantaged children, thus may reduce childhood obesity prevalence in food insecure children.

A health economics logic model is proposed to evaluate how school-based feeding interventions can mitigate the impact of HHFI on childhood obesity. The model categorises children as "food secure" or "food insecure" and consists of three diet quality states; "under recommended dietary intake", "recommended dietary intake", and "over recommended dietary intake". These states then feed into weight status groups "healthy weight", "overweight", "very overweight" and "obese", following analysis of longitudinal data used to identify weight trajectories of children from age 3-17 years.

The aim of the model is to structure the relationships between HHFI and diet and how the intervention impacts childhood weight trajectories. The current questions that arise from the model are, (i) is recommended dietary intake an appropriate measure for evaluating meaningful impacts in children's weight status, (ii) are the weight categories adequate for evaluating how school-based feeding interventions mitigate the harmful impact of HHFI on child health? (iii) can school-based feeding interventions impact total diet as much as to impact child weight, or should other measures be addressed in the model?

Notes

002 | **Brautsch, Louise**

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Organizational readiness to implement school-based interventions promoting healthy weight among children: A mixed-methods study among educational administrators and headteachers in Denmark

Background: Schools are seen as ideal settings for public health interventions, but poor implementation highlights the need for implementation support. In 22 municipalities in the region of Southern Denmark, we assessed educational administrators and headteachers perception of organizational readiness for implementing school-based healthy weight interventions.

Method: We assessed three components of organizational readiness: Motivation, innovation-specific capacity, and general capacity using a mixed-method design: two questionnaire surveys; one with the educational administrator in each municipality (N=22) and one with the local headteachers (N=111). Telephone interviews with educational administrators (N=8) and three focus-group interviews with local headteachers (N=15).

Findings: 57% of the participating municipalities and 43% of the schools have high or very high organizational readiness. Motivation is high (55% schools, 76% municipalities), whereas innovation-specific capacity is low (8% schools, 38% municipalities). The qualitative analysis shows that motivation increases if the intervention is compatible with the primary function of the school e.g., academic performance. Moreover, high general capacity (e.g., facilities for physical activity) does not imply teachers know how to utilize them while teaching.

Conclusion: Our results suggest that only around half of the participating municipalities and schools are ready to successfully implement school-based interventions to promote healthy weight among children. The implementation of future school-based intervention studies should precede or be accompanied by strategies to improve organisational readiness at both levels.

Notes

003 | **Curtis, Tine**

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Strengthening research impact through research-practice collaboration – Enhancing the relevance and applicability of research aimed at generating knowledge to inform changes in practice to improve public health

In Denmark, the municipalities play a significant role in health promotion and disease prevention, including efforts to create healthy environments for children's lives and interventions to reduce overweight and increase the well-being of children.

The collaboration between research and municipal practice enhances researchers' understanding of the context, including conditions for services in the municipalities, and strengthens the definition of research questions that may generate actionable insights and offer practical solutions. Collaboration in the planning of intervention studies and the continued involvement of practitioners throughout the study improves the probability of successful study implementation. Furthermore, this engagement can foster a stronger sense of ownership and commitment to the research outcomes.

Research impact can be strengthened through capacity building on both parts. Research training and the role of researchers need to better support collaboration with practice. Additionally, municipalities often require the capacity to engage in informed dialogues regarding project design and the potential impact of project implementation on both the population and practice.

Research-practice 'bridge building' by institutions and individuals who possess a comprehensive understanding of both domains may support the collaboration and alignment of roles and expectations.

Notes

004 | **Dakin, Clarissa**

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Notes

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Exploring the underlying psychological constructs of eating behaviour: Towards a unifying framework

Pathways to and from obesity are mediated largely through eating behaviours. Over the last 45 years, there has been considerable interest in developing theoretical models and associated constructs that explain individual differences in eating behaviour. However, many of these models contain overlapping theories and shared theoretical mechanisms of action. Currently, there is no recognised standard framework that integrates psychological, physiological, and neurobiological theory to help explain human eating behaviour.

The aim of the current paper was to review key psychological theories in relation to energy balance homeostasis, energy intake and motivation to eat and to develop a comprehensive framework of relevant factors that drive eating behaviour. The key findings from this review suggest that eating behaviour is driven by elements of dual process models which includes conscious processing (reflective factors), and unconscious responses (reactive/impulsive factors) to desires, environmental cues, habits, and associative learning. These processes appear to be mediated by neurobiology and physiological signalling (homeostatic feedback) of energy balance, which is more tolerant of positive than negative energy balances. Eating behaviour constructs (traits) can be explained by three domains/latent constructs (reflective, reactive, and homeostatic eating). Using this framework, interventions can be developed that tailor treatments to target key aspects of eating behaviour.

Future research should aim to examine this conceptual framework with children, to understand whether child eating behaviour can also be explained by reflective, reactive, and homeostatic processes.

005 | **Danielsen, Dina**

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Notes

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Child perspectives on health promotion in kindergarten: Preliminary findings

Background: In Denmark, most children between 1-6 years attend kindergarten many hours daily. This institutional setting thus significantly influences Danish children's opportunities for social, mental, and physical development and positive embodied experiences. Particularly children from lower SES backgrounds or just in need of more support in terms of their general development, wellbeing, and health may gain much from health-promotion interventions in kindergarten.

Aim: This study aims to qualitatively explore 3–6-year-old children's diverse perspectives and physical and sociocultural prerequisites in a health promotion context, including the social dynamics among children and among children and pedagogues in relation to concrete health promotion practices.

Methodology: The theoretical frame is recent childhood sociology and symbolic interactionism, both drawing on ethnographical and visual methods amenable to capture children's embodied expressions and agency as well as sociocultural processes in children's everyday institutional contexts. The empirical data consists of field notes and child interviews from two kindergartens engaged in a health promotion intervention. A "child perspective" is applied as a theoretical and methodological approach.

Findings: The findings illustrate children's different ways of engaging in and navigating institutional rules and the physical space in health promotion activities. While some children seemingly gain positive experiences, some children seem to express "resistance" to the social order and rules related to health promotion activities thus experiencing rejection and exclusion.

Theoretical and methodological issues and perspectives

006 | **Heegaard, Peter**

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Notes

The DTU Ossabaw Facility: An open research Infrastructure platform integrating the Ossabaw pig model of obesity with large animal bioimaging facilities

Highly translational animal models for obesity/metabolic syndrome (metS) comorbidities are in high demand. Obesity/metS comorbidities include chronic diseases such as type 2 diabetes, cardiovascular diseases, and nonalcoholic fatty liver disease. Juvenile obesity is associated with an increased risk of adult obesity as well as juvenile obesity-related disease, in particular juvenile fatty liver disease.

Compared to rodents the pig is a more valid model of obesity/metS with eating preferences (omnivore), behavioral preferences (sedentary), anatomy, including cardiovascular anatomy and function, and immune system (notably, the innate inflammatory response) being more similar to humans. The Ossabaw breed is small (40-60 kg adult weight) with a highly obesity-prone phenotype developed in a 'feast and famine' environment akin to that suggested to shape the human obesity phenotype in early stages of humanoid development.

We, and many others, have documented that high energy, high fat diets result in the rapid development of obesity in Ossabaw pigs. This reproducibly leads to a MetS state with hypertension, high fasting blood glucose and dyslipidemia, with more advanced endpoints such as pre-diabetes, non-alcoholic steatohepatitis (NASH) and cardiovascular disease routinely obtained. Data obtained in the DTU Ossabaw facility (https://ossabaw.dtu.dk/) documenting the performance of the Ossabaw pig as an obesity model will be presented. We suggest the use of the Ossabaw pig for biomarker development and for mechanistic and intervention studies on obesity comorbidities, including juvenile studies.

007 | **Krølner, Rikke Fredenslund**

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Notes

Food for thought: Theorizing, investigating, and avoiding unintended outcomes of prevention of childhood obesity

Background: Obesity prevention in children may cause unintended outcomes as interventions involve human agency and interrupt complex social systems such as families and schools. I will discuss approaches to theorize, assess, and avoid unintended outcomes and invite participants to share their experiences and reflections.

Methods: I will use conceptual frameworks of unintended outcomes and experiences from my own intervention research to address unintended outcomes.

Findings: During intervention development, unintended outcomes may be hypothesized and explored using qualitative studies, literature reviews, dark logic models, and feasibility studies.

Examples of hypotheses: *Paradoxical effects:* Children gain weight e.g., if food is provided by the intervention in school, while children also eat their lunch bags from home; *Harmful externalities:* The intervention produces harms in other outcomes e.g., children become less satisfied with their bodies; *Group and social harm:* Targeted interventions reinforce risk by labelling and stigmatizing children with obesity; *Equity harm:* The intervention only benefits high income families; *Opportunity harms:* Ineffective interventions take resources and attention from more effective ones or more severe problems e.g., mental or social issues. In main trials, hypothesized unintended outcomes may be assessed quantitatively and avoided through careful intervention planning, co-creation of intervention- and communication strategies, and ethical awareness. Emerging unintended outcomes must be explored qualitatively.

Conclusion: We need studies of unintended outcomes to develop interventions that promote healthy weight in children while doing no harm.

008 | **Larsen, Ryan**

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Notes

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Microvascular function of skeletal muscle in children with obesity – a non-invasive MRI study

Introduction: Obesity is associated with vascular endothelial dysfunction. While childhood obesity is associated with cardio-metabolic risk factors, little is known about the effect of obesity on microvascular function in children. We compared skeletal muscle microvascular function, across tibialis anterior (TA), soleus (SO) and gastrocnemius (GM), between children with obesity (iso-BMI>30 kg/m^2; 13.1±1.8 years; n=22) and normal-weight (iso-BMI 19-25kg/m^2; 12.7±2.3 years; n=18).

Methods: Resting supine in the MR scanner, non-invasive blood oxygen level dependent (BOLD) MR images were acquired continuously during 5 minutes of cuff occlusion (240 mmHg) and 3 minutes of reperfusion. From this time series of BOLD images, the hyperemic response to ischemia-reperfusion was assessed via peak magnitude (BOLDpeak; % of baseline) and time-to-peak (BOLDTTP, seconds) in the TA, SO, and GM.

Results: Compared with normal-weight, children with obesity had lower BOLDpeak in TA (101.1±2.9 vs. 108.3±4.4; p<0.001), SO (107.7±3.3 vs. 114.5±6.6; p<0.001) and GM (105.1±3.1 vs. 108.7±4.8; p=0.008). For BOLDTTP, there were no group differences.

Conclusion: Children with obesity exhibit lower BOLDpeak across the three muscle groups, reflecting blunted tissue oxygenation in response to an ischemia-reperfusion paradigm. These results provide new evidence suggesting that obesity, already from a young age, diminishes microvascular function, which may have implications for overall muscle and metabolic function. Future studies are required to examine if exercise or increased physical activity level can improve microvascular function in children with obesity.

009 | **Nogueira, Nuno**

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Notes

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Exploring the impact of departure from Genetically-Determined BMI Homeostasis on Mortality (BMIhom): A work in progress

Background: The U-shaped BMI-mortality risk curve highlights adverse outcomes of high and low BMI. Adipose cell size variation, genetically determined, may influence morbidity and mortality once fatty acid storage capacity is overwhelmed. We propose the concept genetic BMI homeostasis, wherein individuals have a predetermined BMI level influenced by genetic factors regulating glycemic, inflammatory, and lipid control. Environmental exposures lead to deviations, affecting fat mass, lean mass, and mortality risk.

Objectives: 1) Associate deviations from homeostatic BMI with fat mass and lean mass; 2) Investigate associations between deviations and mortality; 3) Translate results into a web-based app for personalized BMI estimation using family history. Planned

Work: Data from Diet, Cancer and Health, Diet, Cancer and Health – Next generations, UK Biobank (UKB), and Netherlands Twin Register (NTR) cohorts. Calculate BMI Homeostatic Index (BHI) using standardized familial BMI divergence scores. Derive PGS scores for genetically predisposed BMI. Explore BHI associations with fat mass and lean mass using linear regression models. Assess BHI relationships with all-cause and cardiovascular mortality using Cox proportional hazards models. Visualize with restricted cubic splines. Compare genetically predicted BMI with observed BMI in the UKB and the NTR cohorts using Cox proportional regression models.

Perspectives: Genetic BMI homeostasis unveils adiposity-related health risks. Personalized prevention strategies based on deviations from homeostatic BMI and associations with fat mass, lean mass, and mortality risk inform public health interventions to reduce premature mortality.

010 | Nybo Andersen, Anne-Marie

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Co-author:
Katrine Strandberg-Larsen

Co-evolution of mental health and body size from infancy to early adulthood in the Danish National Birth Cohort

The Danish National Birth Cohort was established between 1995 and 2003, aiming to create a womb-to-tomb cohort with systematic and prospectively collected data for life-course studies. The cohort has now rich data on intra-uterine exposures, exposures through infancy, childhood, and adolescence as well as self-reported height and weight data and mental health indicators on more than 90,000 individuals from birth to age 18. The 25- year follow-up has recently been launched.

It is well-known that many types of mental ill-health and body dimensions are strongly associated. The way of which these associations are causally linked are less understood, partly because lack of appropriate data, partly due to insufficient methodological approaches to describe how body size affects mental health and vise versa - at the same time and over time from birth to adulthood.

In a research program under development, we aim to take advantage of the opportunities given by the rich data in the Danish National Birth Cohort, for which we are principal investigators and have been responsible for the data collections. Using these data and building on the newest methods in trajectory modelling of longitudinal data, we will explore how individual's mental health and body dimensions interact and mutually affect each other, in different time periods of childhood and adolescence.

Notes

011 | Schramm, Stine

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How do we calculate the burden of obesity on a population level?

In Denmark, it is both argued that obesity does and does not have a high burden. This disagreement may stem from different methods used the published literature on obesity and all-cause mortality. To calculate deaths attributable to obesity, two components are used; the prevalence of obesity and relative risk associated with obesity. When calculating the relative risk, several design criteria are recommended to minimize bias, for example: long follow-up period, a wash-out period, disease free study population at baseline, and adjustment for relevant confounders.

In an often-cited meta-analysis (2016), the risk of dying among persons with obesity differs across smoking status, where the highest relative risk is seen for those who never smoked. Using nation-ally representative data from Denmark, the same phenomenon is ob-served. This may be explained by smoking related mortality occurring within shorter time than obesity related mortality. Some authors argue that the relative risk for death associated with obesity in those who never smoked is the 'true' estimate, and consequently, apply this to the entire study population - regardless of smoking status - when calculat-ing the total number of deaths attributed to obesity. Others argue that the relative risk should be calculated among the general population, and thus, either adjust for smoking or apply relative risks for each smoking status. This difference in calculating the relative risk has a great impact on the total number of excess deaths attributed to obesity. Lastly, the burden of obesity should be measured with additional out-comes such as hospital and GP contacts, and absence from work.

Notes

012 | Stubbs, James

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Notes

Developing a satiety map of common food

The satiety value of foods is critical for obesity prevention and management. Food composition data are widely available. There is no equivalent reference system for the satiety value of different foods. Modelling satiety is complex because it requires integration of nutritional, physical and sensory characteristics of foods with characteristics of consumers.

We are developing a map of perceived satiety (PS) of a large range of common foods (SatMap) and examining what explains the ranking of foods in that index. The foods are assessed using a web-based platform to measure the PS value of representative food images. The sample of foods is structured by energy density, macronutrient composition, food groups and sensory profiles. PS is measured using visual analogue scales. A variety of additional psychometric and demographic measures are also made.

Initial findings using 97 foods in 4000 participants shows that foods vary considerably in their PS. Multiple regression shows that portion size, protein and total carbohydrates all increase PS. Energy density, (kcal/100g), sugars and salt all decrease PS. Decision-tree models show that energy density, sugar, protein, portion size and fat content partially explain the ranking of PS. These models only explain 50% of the variance in PS, meaning there is more to explain from the demographic, sensory and eating behaviour trait data. We are currently implementing two expanded surveys of >300 representative foods in the UK population.

The SatMap reference system will improve dietary management of weight and health and understand the development of learned food preferences and satiety from childhood to adulthood.

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Notes

013 | **Bergsten, Peter**

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The Swedish Ending Childhood Obesity Initiative

More than half of the Swedish population has overweight or obesity. Of particular concern is that childhood obesity has risen dramatically in recent years. Obesity tracks into adulthood with consequences for the individual including developing type 2 diabetes and other diseases. Obesity is largely preventive. Obesity causes suffering of individuals and non-sustainable surging costs in health care. Cost of obesity alone are estimated to 70 billion SEK annually. This triggered the Swedish Ending Childhood Obesity (ECHO) initiative (https://swelife.se/en/echo/), where prevention of childhood obesity was chosen as example of how to orient society towards prevention. The initiative started 2020. The vision of ECHO is that no child should have obesity at school start at 2030. The initiative focusses on children 0-6 years old for lifelong impact of obesity prevention.

Three learnings have come from ECHO. Firstly, childhood obesity is a complex societal problem requiring engagement from multiple actors in society long-term. Secondly, the municipality and its region (responsible for child health care in Sweden) represents an arena holding he complexity of actors and therefore suitable as intervention place. Thirdly, in order to identify interventions that are effective and sustainable and potentially scalable, the implementation of the interventions need to be followed by continously collecting child health and other societal data from other layers in society.

These learnings form the basis on ECHO's current national and international work on building "examples", which are municipalities where systematic work to preventing childhood obesity is conducted and guided by data.

Notes

014 | **Dalstrup Jakobsen, Dorthe**

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Long-term Changes in Eating-related Problems and Quality of Life in Children with Overweight and Obesity Attending a 10-weeks Lifestyle Camp

Background: A substantial proportion of children with overweight and obesity have eating-related problems and further, a decreased Quality of Life (QoL) compared to peers with normal weight. The aim of this study was to investigate the immediate and long-term changes in self-reported overeating (OE), binge eating (BE), and QoL in children attending a 10-weeks lifestyle camp, and additionally, investigate if BE before camp was associated with QoL 52-weeks after camp.

Methods: Seven to fourteen-year-old children attending camp between October 2020 and March 2022 were recruited. Children were referred to attend these multicomponent lifestyle camps if they had overweight/obesity, were lonely, unhappy or had social or family-related problems. Children answered the EDE-Q and PedsQL with a parent present at baseline, 10-weeks and 52-weeks.

Results: In total, 76% reported eating-related problems before attending camp with 38% screened positive for regular BE. The prevalence of regular OE and regular BE was reduced after 10-weeks at camp (14% vs 3%; 37% vs. 9%) with sustained changes at 52-weeks (6% and 10%, respectively). All QoL dimensions improved after camp with greatest improvements in social functioning. The presence of self-reported BE at baseline was significantly associated with a lower QoL at the 52-weeks follow-up.

Conclusion: Eating-related problems and QoL improved immediate and 52-weeks after camp. Children reporting BE before camp had a higher risk of impaired QoL 52-weeks after camp underlining an urgent need for a valid and sensitive screening tool to identify eating-related problems in children seeking obesity treatment.

Notes

015 | **Damsgaard, Camilla T**

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Dietary intervention to promote healthy weight development among 6-11 year-old children in the Generation Healthy Kids project

Background: A healthy diet is key in the prevention of childhood overweight. Danish children consume too little vegetables, wholegrains, and fish, and too much sugar and fat and early efforts are needed. This should be addressed in the different settings of the child's life in a manner that supports healthy long-term behavior change and food literacy.

Aims: Within the Danish Generation Healthy Kids project, work package (WP) 2 aims to support 6-11-year-old children in eating healthier during school hours, improve children's food literacy and enable parents and the local food environment to support healthier diets at home.

Methods: Generation Healthy Kids is a cluster-randomized controlled 2-school year trial in 24 local communities. It includes 2200 children who start 1st or 2nd grade in 2023, and aims to promote healthy weight. In WP2, a new model for school lunches in Denmark is being developed and will be implemented at the 12 intervention schools. School staff will receive training and be actively involved in the implementation. Parents will be invited for activities to improve weekend habits and the local supermarkets will be engaged.

Results: The dietary intervention will be presented at the conference. The impact on children's dietary intake will be measured by 4-day dietary records, questionnaires and blood biomarkers. Food literacy will be assessed by an age-specific questionnaire.

Conclusions: A multi-setting dietary intervention is currently being developed and implemented in 12 local communities. The future will show the impact on children's dietary intake, nutritional status, and food literacy and ultimately on healthy weight development.

Notes

016 | **Händel, Mina Nicole**

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Fourth follow-up of the Childhood Health Activity and Motor Performance School Study – Denmark (CHAMPS Study-DK). A study protocol of a prospective longitudinal cohort study

Background: Good habits are established in childhood, and an active life of children and adolescents is an effective strategy to prevent chronic diseases including obesity.

Objective: We aim to assess the long-term effect of introducing sport schools with increased physical education on future habitual physical activity, risk of overweight and obesity, and several markers for metabolic diseases.

Design: Utilizing a societal experiment design, participants who went to sport schools that offered 6 physical education lessons per week, will be compared to participants attending schools that continued with the usual 2 physical education lessons per week. The study population consists of 2163 individuals (born in 1997 to 2003), who have at least one data point in the data collection period: CHAMPS 1 (September 2008-March 2011), CHAMPS 2 (August 2011 - June 2014), SOUND/HEARING (October-December 2014), CHAMPS 3 (April-June 2015), or EYESIGHT (January 2015). The study period of CHAMPS 4 is March 2022 to December 2023. The study uses objective methods for all physical measurements, including accelerometers for physical activity, DXA for fat- and lean-mass, and blood markers for CVD and T2D. In September 2023, 619 individuals have completed the clinical examinations.

Perspective: Schools are an obvious place to promote health. Here, it is ensured that most children get enough exercise in everyday life, regardless of ethnic and/or socio-economic background and without stigmatizing children who are at high risk. Furthermore, it would be of great value if a reduction in the risk of lifestyle diseases can be induced by introducing just a few extra hours of physical education to the school curriculum.

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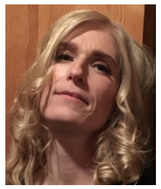

017 | **Izindre, Ann-Louise**

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Co-authors:
Anette Falkenroth, Peter Bergsten

Health data accessible for Storfors – planning our actions to combat childhood obesity

In the Swedish municipality Storfors, Värmland, childhood obesity prevalence is high. Despite efforts of intervention the numbers are not going down but up. To tackle this problem municipality health workers follow child health data. However, data that come to the municipality is not up-to-date and come on an annual basis, which causes problems in identifying what interventions are effective and which ones are not.

To address this problem Storfors turned to the Swedish Ending Childhood Obesity (ECHO) initiative (https://swelife.se/en/echo/). ECHO has a broad representation of different expertise within childhood obesity and its prevention and treatment. In working with the ECHO representatives different aspects of how childhood obesity can be addressed in Storfors has been discussed based on childhood obesity conditions and activities present in Storfors. Based on this interaction Storfors is now collaborating with ECHO in both national and international contexts with the goal of finding interventions that will effectively and sustainably reverse obesity in children in Storfors and beyond.

Notes

018 | **Karlsson Eriksen, Karen**

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Notes

The Child Life in Healthy Balance - A parallel track community-based health promotion program to prevent obesity and improve wellbeing among children in low-income areas. Insights from co-creating evidence-based interventions and their implementation

The Child Life in Healthy Balance program is a community-based health promotion program that aims to prevent obesity and improve wellbeing of children living in low-income areas by strengthening the work and co-operation between municipal and other local agents and create healthy everyday life environments.

The program was developed and tested in 10 communities across tree municipalities in Denmark. We received funding from the Nordea-Foundation for a 5-year development and testing period while the Novo Nordisk Foundation has supported research related to the programme. The evaluation is performed by the National Institute of Public Health.

The program was designed from a parallel track perspective with an evidence-based framework and pre-defined health promoting objectives as a shared basis among local agents for co-creative development of specific interventions.

Preliminary results from the process evaluation show engagement among participants in the development phase and ownership of the implementation process by management and professionals locally. The programme has benefited from a clear political commitment to work with the program objectives for a minimum of 10 years and the implementation has been supported by the local project managers and the central backbone organization trough continues communication and regularly meetings and workshops to disseminate knowledge and exchange experiences.

Experienced from the program on the translation of evidence into specific interventions and on conditions for successful implementation will be relevant for future multicomponent interventions to promote childhood obesity.

019 | **Lockenwitz Petersen, Therese**

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Co-authors:
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Notes

Healthy and active children on the Island Moen: A feasibility study building on participatory system dynamics approaches to promote local engagement and activities targeted healthy living among children

Background: Unhealthy weight development and poor mental health are complex problems that require cross-sectional solutions. In the Danish Zealand Region, Vordingborg Municipality has some of the highest proportions of overweight and poor mental well-being. In recent years, this has also been observed in children of the municipality.

Aim: To investigate if community-based participatory system dynamics approach could be used in a Danish setting as a method to enhance local engagement and activities aiming to promote greater wellbeing and healthy weight among children living on the Island Moen.

Methods: The intervention consisted of a system dynamics process, including group model building workshops with local stakeholders. This was followed by action group formation and development of activities.

Outcomes: community readiness was evaluated using the community readiness assessment tool and local capacity was evaluated using an adapted version of the COMPACT questionnaire. An adapted version of the Ripple Effect modelling (RME) was used to track actions. Evaluation of the processes was conducted by interviews.

Results: The participatory system dynamics approach seems to encourage local stakeholders and citizens to take action and engage in development of actions trying to create a healthier development for their children. Further, cross-sectional collaborations were strengthened. The RME has shown to be useful in the tracking of actions afterwards.

Conclusion: A community-based participatory system dynamics approach seems promising – also in a Danish setting – when building capacity and community engagement to drive systems changes to promote healthy behaviors in children.

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Common actions for the prevention of overweight and obesity among children in the Nordic countries

Childhood obesity is a most serious public health challenge, and the increasing prevalence of overweight and obesity among children in the Nordic countries is worrying. Children with overweight and obesity have a higher risk of carrying these conditions into adulthood, and recent evidence also indicates an association between the prevalence of obesity in childhood with a higher risk for developing some cancer forms in adulthood.

The Nordic countries' cancer societies are therefore developing a set of common Nordic recommendations for the prevention of overweight and obesity among children, with particular focus on actions that will mitigate the societal and structural causes of overweight and obesity.

The project's first element is a systematic review of the evidence on policy initiatives that cover such subjects as: taxes and fiscal policies; marketing restrictions and regulations; product labelling; product reformulation; early childhood prevention; availability and affordability; public standards; school health; and health literacy. The common Nordic recommendations for the prevention of overweight and obesity will be based on results from the review.

A second element is a survey of the Nordic populations' support for the implementation of the recommended measures and policies aimed at the prevention of overweight and obesity among children. The project's results and recommendations will be presented at a high-level political conference in November 2024.

We will present preliminary results for the systematic review and the development of the Nordic survey at the Science Cluster conference on Prevention of Childhood Obesity.

Notes

021 | **Mikkelsen, Marianne**

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The Copenhagen prospective studies on Asthma in Childhood (COPSAC) Cohorts

COPSAC is a large clinical research center at Herlev and Gentofte Hospital.

Our focus area is to understand how early life (gene-environment interactions) has an impact on health and disease in childhood and how it tracks further into adulthood. We follow 1100 children and their families (the COPSAC2000 and COPSAC2010 cohorts) and have collected a wide range of clinical data and biological samples from the children from when they were newborns and up through their entire childhood, as well as a lot of data on the children's mothers (e.g. genetics and BMI). So we have a very detailed insight into the children's microbiome and genetics, as well as a lot of longitudinal clinical data on growth, lung function, allergies and asthma. In addition, at the age of 10, we carried out a large visit with a focus on the children's cognitive development and mental well-being. We therefore have the opportunity to look at connections between mental well-being/functioning and overweight.

Since growth and mental well-being are not COPSAC's core areas, but are areas that we have ventured into in recent years, my motivation for participation is to be updated on what is happening in research in the area, as well as to draw inspiration for new projects and interventions in our own child cohorts and for the new cohort we are establishing. I also see the conference as a really good opportunity to establish new research collaborations.

Notes

022 | **Olsen, Nanna Julie**

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Long-term effects of a primary weight gain prevention intervention among healthy weight obesity susceptible children. Results from the Healthy Start study

Background and aim: Primary prevention of overweight and obesity has only been applied in few studies so far. The aim was to examine the long-term effects of the Healthy Start primary obesity prevention RCT that was conducted among healthy weight children susceptible to develop obesity.

Material and methods: The intervention involved individual guidance on healthy lifestyle habits. Children were 2-6 years at baseline and the intervention lasted 1.3 years. Information on height and weight at school entry was obtained from the Danish Children Database when children were around 7 years. The average follow-up time in this study was 2.7 years.

Linear regression analyses on changes/1year in BMI (DBMI) and BMI z-scores (DBMIz) were performed. Analyses were adjusted for gender, baseline age, and outcome baseline value.
Results: At 2.7 years after the baseline examination, no differences were observed between the intervention and control group in DBMI (D=0.07 (-0.02;0.15), p=0.14) or DBMIz (D=0.04 (-0.02;0,10), p=0.19).
Conclusion and perspectives: No long-term effects of the intervention were observed on BMI or BMIz. We are still far from understanding how to prevent the primary drivers behind weight gain in children.

Notes

023 | **Pontes, Cátia**

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Impact of the Veggies4myHeart Project on Preschoolers' Willingness to Try Vegetables

The tendency to reject vegetables in preschool children is common. Aware of the importance of vegetable consumption for health promotion, finding strategies to promote this consumption is essential.

The Veggies4myHeart project aims to prevent obesity and promote vegetable consumption in preschool children. Veggies4myHeart is a prospective longitudinal study with children from 3 to 6 years old in preschools. A questionnaire was applied to the parents to characterize the sample. A children's story was used as a pedagogical tool related to five vegetable superheroes (carrot, lettuce, red cabbage, cucumber, tomato). The willingness to try (WTT) was compared between "Veggies" - the vegetables covered in the project and vegetables not covered (endive, radish, spinach, arugula, red bell pepper) through a 5-point scale, the Farfan-Ramirez Willingness to Try Scale (FR-WTT).

Wilcoxon Test was used to compare the WTT in both groups of vegetables before and after the intervention. This school year, 178 children (54.5% girls) participated in the project, with a mean age of 4.1 (SD=0.9) years. Parents who answered the questionnaire (n=138, 77.5%) had a mean age of 35.6 (SD=7.1) years. Regarding the level of education (n=136), most parents completed the 12th year (n=62, 45.6%), and the second largest group had a higher education degree (n=48, 35.3%). There was an increase in the WTT in the "Veggies" group (p<0,001) and the other five vegetables (p=0,021). There was a significant increase in WTT "Veggies" and others in the project's intervention. However, this increase was higher in the group of "Veggies", indicating that the project intervention effectively increased the WTT vegetables.

Notes

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Evaluating empowerment counselling in Portuguese well-child visits: A cross-sectional study assessing families' and nurses' perspectives

Introduction: Empowerment counseling for promoting healthy lifestyles is widely acknowledged for its positive impact on people's health and is strongly encouraged in routine primary healthcare, namely in well-child visits. Our study aims to evaluate perceptions concerning the degree of empowerment counseling for healthy family lifestyles in Portuguese well-child visits and explore associations with nurses' and families' characteristics.

Methods: We conducted an observational cross-sectional survey study involving 82 families, attending a well-child visit for their 5-year-old children and 25 nurses from 12 health functional units in Portugal's Central Region and the Metropolitan Area of Lisbon. The survey included the Portuguese Empowering Speech Practice Scale (relational-empowerment practices and participatory-empowerment practices), Parent's Longitudinal Continuity in Primary Care scale, Family Nutrition and Physical Activity tool, anthropometric, and sociodemographic questions.

Results: Both nurses and families perceived high implementation of empowerment counseling with participatory practices being less prevalent than relational practices. Nurses trained in empowerment education and obesity scored higher on the relational-empowerment scale. Parents with greater continuity with primary care obtained higher empowerment counseling scores.

Conclusion: Further efforts are needed to clarify the relationship between family risk of childhood obesity and empowerment counseling in well-child visits. These findings offer valuable insights to strengthen nurses' competencies, emphasizing participatory practices, childhood obesity training, and continuity of care.

Notes

025 | **Rosário, Rafaela**

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The effectiveness of a school-based intervention program in preventing overweight among children: The BeE-school project

Aim: to analyze the effectiveness of a school-based intervention program focused on health promotion on overweight among children with vulnerable conditions.

Methods: A total of 735 children (51.7% boys) from 10 schools participated in this cluster-randomized trial, with a mean age of 7.7 (1.2) years old. The schools were randomized into the intervention arm (353 children, 4 schools) and the control arm (382 children, 6 schools). The intervention was co-developed through online and offline social listening and was based on health promotion assumptions and the Fogg behavior model. The intervention program included educational sessions for teachers and their intervention during classes.

Data collection included baseline and post-intervention measurements of weight, height, and waist circumference using standardized procedures. Body mass index (BMI) was calculated, and Z-scores were computed following WHO criteria. Additionally, information on sex, age, grade, school cluster, and mother's education level was collected.

Results: Intervened children, when compared to the control group, exhibited a significantly lower BMI (z-score) ($b=-0.108$; $p<0.001$), even after adjusting for confounders. The difference persisted even when the data were divided into overweight categories.

Conclusion: The school-based intervention, which focused on teachers training in health promotion while respecting their autonomy in training, seems to be effective in reducing the BMI z-score in children. Further studies are needed, especially to evaluate the long-term effects of the intervention.

Notes

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While we are not directly involved in scientific research within this field, we strongly support and fund research initiatives and work with a good evidence base for our work. We have recently published two relevant publications that contribute to the field on childhood health and obesity prevention:

1. An Evidence Brief: This review examines the impact of digital marketing of high-fat, high-sugar, and high-salt (HFSS) products on the food choices of children and young people. It encompasses psychological, behavioral, and health-related parameters, analyzing studies published from 2010 to 2021.

2. Mapping Digital Exposure to Marketing among Danish Adolescents: This comprehensive study focuses on understanding adolescents' experiences, perceptions, and attitudes towards marketing on social media. It assesses exposure to HFSS products, enabling us to gauge the extent and nature of marketing's influence on young people.

(The publications is in danish and not publish in af scientific paper).

These publications are complemented by additional researchpapers, positionpaper, evidence brief and insights aimed at strengthening child protection against unhealthy marketing practices. The WHO identifies restrictions in this area as an effective measure to prevent obesity among children and adolescent.

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Four extra physical education lessons seems to reduce inequity in childhood overweight and obesity. The CHAMPS Study DK

Objective: To evaluate how six physical education (PE) sessions in schools affect the likelihood of obesity over time, and to examine how this effect varies among different social groups.

Backgroound: Childhood overweight and obesity (OW/OB) are risk factors for numerous non-communicable diseases (CVD, type-2-diabetes)[1,2].

When it comes to OW/OB, multicomponent interventions focusing on physical activity and diet, have shown some promise in school settings[3,4]. While these interventions have short-term effects, their long-term impacts are unclear. Similar interventions in non-school settings don't any effects[4,5]. Recent studies highlight a social gradient, with lower education levels correlating with increased risk of youth overweight and obesity[6,7].

Methods: The study, a natural experiment, involved ten schools. Six schools had six PE lessons, four schools had two[8]. The IOTF classification for normal weight, OW/OB was used[9]. Mothers educational level was used for social status: 1. Bachelors degree and above, 2. high-school and short tertiary education, 3. 9th grade, 10th grade and vocational education. We used mixed logistic regression models adjusted for baseline BMI, gender, age and pubertal status to assess the probability of OW/OB across social status over the five years of the study.

Results: There was a difference in social status group three; the probablity with six PE-lessons was 24.8% (95% CI 29.6;30.0) and with two PE-lessons 34.9% (95% CI 28.6;41.3).

Conclusion: There seems to reduced inequity in OW/OB in children with six PE-lessons per week compared to children with the normal two lessons.

(References available upon request).

Notes

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Socio-economic Patterns among Young Adults with Childhood-onset Obesity Treated with Semaglutide – the RESETTLE trial

Background: The RESETTLE trial investigates the efficacy of semaglutide in youth with childhood-onset obesity. Obesity prevalence is higher in socioeconomically disadvantaged populations. Further, obesity and health concerns may be linked due to the potential negative impact on health and wellbeing.

Aims: Based on the response to hospital-based treatment during childhood we will:

1) Identify underlying socio-economic determinants that impact response to obesity treatment

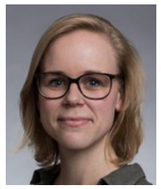
Methods: Ongoing, randomized, placebo-controlled trial. 124 (age: 23±3 ys, BMI: 40±6 kg/m^2) of expectedly 170 young adults who attended hospital-based obesity treatment during childhood (The Holbæk Model) have been included based on previous responses to treatment and current BMI. Socioeconomic parameters were assessed by questionnaires (sociodemographics, PedsQL).

Preliminary baseline results: Concern for own health was increased in young adults with BMI>45 kg/m^2 compared with BMI<35 kg/m^2, whereas labor force participation, educational level, parental education level, or parental labor force participation were similar between BMI subgroups (BMI: 30-35; 35-40; 40-45; >45 kg/m^2). Young adults who reduced their degree of adiposity during childhood treatment had lower BMI (n=52; BMI 38±5 kg/m^2) compared to young adults with unchanged childhood adiposity during treatment (n=72, BMI 41±6 kg/m^2) with similar socioeconomic parameters.

Discussion: High degree of obesity was associated with increased health concerns. Lack of reduction in childhood adiposity during treatment was associated with higher obesity levels in young adulthood, even with similar socioeconomic status.

Clinicaltrials.gov: NCT05574439Role of social, psychological, psychiatric aspects

Notes



029 | **Elsenburg, Leonie**

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Early childhood adversity and body mass index in childhood and adolescence: Linking registry data on adversities with school health records of over 50,000 children from Copenhagen

Objective: We examined whether childhood adversity in early childhood (0-5 years) is associated with body mass index (BMI) in childhood (6-7 years) and adolescence (12-15 years).

Methods: In this study, we combined data from the register-based DANLIFE study on childhood adversities with height and weight data of school children in Copenhagen. Data were available for 53 401 children born in Denmark between 1980 and 1996. Children were divided into groups of early childhood adversity by applying group-based multi-trajectory modelling using their annual count of childhood adversity from 0-5 years in the dimensions of material deprivation, loss and threat of loss and family dynamics. Direct and total associations between the early childhood adversity groups and BMI z-scores in childhood and adolescence were estimated using sex-stratified structural equation models.

Results: Five groups of early childhood adversity were identified. These were characterized by low adversity (51%), moderate material deprivation (30%), high material deprivation (14%), loss or threat of loss (3%) and high adversity (2%). Boys and girls who experienced moderate or high material deprivation and loss or threat of loss had slightly higher BMI z-scores, especially in adolescence, compared with those who experienced low adversity. In addition, boys who experienced high adversity had slightly lower BMI z-scores in childhood than boys who experienced low adversity.

Conclusions: The identified associations and their effect sizes suggest that changes in weight-for-height in childhood and adolescence is probably not a major explanatory mechanism linking early childhood adversity with later life morbidity.

Notes

030 | **Engelbrekt Rossander, Helle**

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Structural level-approaches and child obesity

Background: There are a broad range of weight interventions aimed at children with obesity on the individual level and to a greater extent, on the family level. However, their effectiveness has not been shown in the long term, and there is a need for a broader socio-ecological perspective to enlarge the context. The aim of this study is therefore to understand how children with obesity and their parents experience impacts of structural-level approaches on their daily life.

Setting: Children in rural municipalities in Denmark. Participants were recruited via a child obesity programme run by the local municipality health services.

Design: A qualitative study based on data from qualitative, semi-structured interviews of six children and their parents. The interviews were audio-recorded, transcribed verbatim. The data was analysed in a dual coding process, and finally, thematised into categories.

Results: The study points to challenges and dilemmas related to structural-level impact in schools, on leisure, and on commuting to school. However, childhood obesity is primarily seen as a problem with individual responsibility.

Conclusion: Activities in schools and in leisure time, and facilities available in the community have some impact on children's experiences in everyday life. However, there is no simple linear explanation of the relationship of that matter, and more research is needed to deeply explore the dynamic interplay in and around the children and peers on the structural level and how to encounter the children with obesity.

Notes

031 | **Lawaetz Wimmelmann, Cathrine**

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Childhood adversity trajectories and weight categories in young adulthood: A register-based study including 393,837 Danish men

Background: The association between childhood adversities and later overweight and obesity is well-established. However, there has been a call for studies replicating the findings in a large population-based sample applying prospectively obtained adversity trajectories across childhood, as adversities tend to cluster over time. Previous studies may, thus, have underestimated the effect of adversities on the development of obesity. In addition, adversities in childhood may also be associated with underweight, possibly as an indicator of poor mental and physical health.

Aim: The aim of the current study was to investigate the association of adversity trajectories from 0-16 years on weight categories in young adulthood (18-26 years).

Method: The Danish life course cohort (DANLIFE) was linked with the Danish Conscription Registry (DCR) resulting in a study sample of 393,837 boys, who have information on adversities from DANLIFE and on height and weight assessed at a draft board examination from DCR. Associations of adversity trajectories and weight categories were investigated in multinomial regression models.

Results: Results showed that the adversity groups had higher risk underweight, overweight, or obesity than normal weight compared to the 'Low adversity' group. The high adversity group showed the strongest associations with both underweight (1.38 (1.27; 1.50)) and obesity (1.49 (1.39; 1.60)) when adjusting for parental origin, birth year, age at draft board, maternal age, preterm birth, and size for gestational age.

Future perspectives: Future studies should investigate the importance of early adversity trajectories for BMI trajectories in childhood.

Notes

032 | **Longmore, Danielle**

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Social patterning of body size-based discrimination in Australian youth

Background: Weight and body-size related stigma is pervasive and contributes to discrimination and to adverse long-term health and wellbeing outcomes for individuals. Little is known about the prevalence of weight and body size stigma and discrimination among youth, particularly in Australia.

Aims: To determine the prevalence of body size and appearance-based discrimination in a representative sample of Australian youth and to describe the proportion of discrimination experienced by those of different genders, body sizes and by socioeconomic status.

Methods: Data from the nationally representative Longitudinal Study of Australian Children will be evaluated. Young people aged 14-15 years were asked about discrimination relating to their body size and appearance. Experience of body size related discrimination will be evaluated by gender, by BMI and by socioeconomic status based on neighbourhood disadvantage.

Results: Data is currently under analysis and results will be presented at the conference.

Discussion/Conclusion: The findings from this analysis will be the first report of prevalence data relating to weight and body size related stigma among youth in Australia. Findings will be compared to prevalence reports from other countries (US, UK, Sweden). Findings will inform public policy and clinical practice across Australia and will contribute to the expanding global understanding of this area of discrimination.

Notes

033 | **Pedersen, Christina**

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Notes

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Food addiction in adolescents with mental disorder across diagnostic categories

Adolescents with mental disorder are at elevated risk of developing obesity, partly due to sedentary lifestyle, side-effects from psychopharmacological treatment, and poor diet. Food addiction is characterized by an addiction-like attraction to highly processed foods, and strongly associated with obesity, T2D, and affected wellbeing. Food addiction has been shown to be prevalent in individuals with mental disorder and may also play an obesogenic role in this context. This study aimed to investigate i) if the prevalence of food addiction differs across diagnostic categories in adolescents with mental disorder, and ii) whether food addiction could be a result of psychopharmacological treatment.

Data stems from the Food Addiction Denmark (FADK) Project – a survey and register based study. In total n=484 adolescents (mean age 15.5 years, SD = 1.3, Range 13–18) diagnosed with mental disorder drawn from the Danish Psychiatric Central Research Register completed a survey including the Yale Food Addiction Scale for Children 2.0.

The prevalence of food addiction ranged from 3.7% to 16.5% across diagnostic categories. The association between psychopharmacological treatment and food addiction was not statistically significant (OR:1.50, p=0.172).

The prevalence of food addiction differs across diagnostic categories of mental disorders. Furthermore, the results indicate that the generally high prevalence of food addiction in this group is not solely a result from psychopharmacological treatment. Clinicians should probably pay attention to food addiction symptomatology in adolescents with mental disorder.

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Association of body weight in childhood, adolescence, and young adulthood with later risk of disabilities and early retirement among Danish nurses

Background: Obesity is now the most common health problem in the younger population in Western societies and obesity rates are higher in lower socioeconomic status (SES) groups. We investigated whether overweight in childhood, independently of overweight in adulthood, influenced adult labour market affiliation and later risk of having disabilities. Using data from the Danish Female Nurse Cohort study, we examined associations between overweight in childhood and adolescence and disabilities and early retirement in later adulthood (>44 years) and whether it was influenced by menopausal age (< or ≥ 52 years). We analysed data from 10,363 female nurses recruited in 1999, who reported whether they, as children, were heavier or of similar weight as their peers at any age below 13 years, their weights, and heights at 25 years, their current work situation and whether they had had disabilities for more than 6 months.

Results: Our results showed that overweight in childhood, adolescence and young adulthood was associated with an increased risk of disabilities and early retirement. Especially childhood overweight that did not persist into adulthood was associated with an increased risk of disabilities (OR=1.82, 95% CI=1.26-2.63) and early retirement (OR=2.05, 95% CI=1.38-3.03) in the postmenopausal group. A similar increased risk for disabilities (OR=1.76, 95% CI=1.26-2.47) was seen for adolescent overweight that did not persist into adulthood.

Conclusion: The results show that in a well-educated population of women, childhood overweight had adverse socioeconomic consequences for later risk of disabilities and early retirement irrespective of overweight in adulthood.

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The restriction of marketing of foods to children as a tool to prevent obesity: The case of WHO Nutrient profile model

Based on Sustainable Development Goal 3: “Ensure healthy lives and promote well-being for all at all ages” and the definition of obesity as a multifactorial disease resulting from a combination of the obesogenic environment, psycho-social factors, and genetic variants (International Classification of Diseases 11 (ICD-11)) including the effects of marketing strategies, food habits, and policy guidelines, the poster will focus on the paths that the World Health Organization is going to follow to tackle this issue, in the field of the establishment of a harmonized method for nutrient profiling in the European Union, known as the “classification of foods for specific purposes based on their nutrient composition for reasons related to preventing disease and promoting health” (WHO). As a prominent subject of discussion, the WHO Regional Office for Europe has undertaken efforts to enhance the implementation of a common evidence-based tool: WHO Nutrient profile model.

The objective of this initiative is to take decisive action in order to restrict the marketing of food products high in energy, free sugars, saturated and trans fatty acids, and salt, specifically targeting children. Along with political and legislative guidelines that need to be issued considering the current lack of specific legislation on nutrient profiles, the WHO initiative can help prevent childhood obesity together with early nutritional education and school meal requirements. Despite the lack of legislation, this subject is strongly related to Pros and cons will be analyzed in order to identify strengths and weaknesses and to put forward effective solutions to regulate unhealthy food advertising to children.

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Notes

Structural level-approaches and child obesity

Background: There are a broad range of weight interventions aimed at children with obesity on the individual level and to a greater extent, on the family level. However, their effectiveness has not been shown in the long term, and there is a need for a broader socio-ecological perspective to enlarge the context. The aim of this study is therefore to understand how children with obesity and their parents experience impacts of structural-level approaches on their daily life.

Setting: Children in rural municipalities in Denmark. Participants were recruited via a child obesity programme run by the local municipality health services.

Design: A qualitative study based on data from qualitative, semi-structured interviews of six children and their parents. The interviews were audio-recorded, transcribed verbatim. The data was analysed in a dual coding process, and finally, thematised into categories.

Results: The study points to challenges and dilemmas related to structural-level impact in schools, on leisure, and on commuting to school. However, childhood obesity is primarily seen as a problem with individual responsibility.

Conclusion: Activities in schools and in leisure time, and facilities available in the community have some impact on children’s experiences in everyday life. However, there is no simple linear explanation of the relationship of that matter, and more research is needed to deeply explore the dynamic interplay in and around the children and peers on the structural level and how to encounter the children with obesity.

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Notes

Co-evolution of mental health and body size from infancy to early adulthood in the Danish National Birth Cohort

The Danish National Birth Cohort was established between 1995 and 2003, aiming to create a womb-to-tomb cohort with systematic and prospectively collected data for life-course studies. The cohort has now rich data on intra-uterine exposures, exposures through infancy, childhood, and adolescence as well as self-reported height and weight data and mental health indicators on more than 90,000 individuals from birth to age 18. The 25- year follow-up has recently been launched.

It is well-known that many types of mental ill-health and body dimensions are strongly associated. The way of which these associations are causally linked are less understood, partly because lack of appropriate data, partly due to insufficient methodological approaches to describe how body size affects mental health and vise versa - at the same time and over time from birth to adulthood.

In a research program under development, we aim to take advantage of the opportunities given by the rich data in the Danish National Birth Cohort, for which we are principal investigators and have been responsible for the data collections. Using these data and building on the newest methods in trajectory modelling of longitudinal data, we will explore how individual's mental health and body dimensions interact and mutually affect each other, in different time periods of childhood and adolescence.

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Early Rapid Growth (ERG) weight trajectories in infancy: Investigating the roles of maternal depressive symptoms and infant distress

Center for Early Intervention and Family Studies (CIF) has since 2015 certified health visitors in 82 Danish municipalities in the standardized observational tool, Alarm Distress Baby Scale (ADBB) for the assessment of infant distress in home visits. We will use data from 52 municipalities, including a min. of 145.000 infants born 2014-2023 and their mothers.

Infant weight gain will be categorized into 4 groups, based on a change of > 0.67 SD in weight-for-age z-scores, defined as: slow weight gain < −0.67 SD, mean weight gain − 0.67 to 0.67 SD, rapid weight gain > 0.67 to 1.34, and > 1.34 very rapid weight gain. Infant weight and height is measured by the health visitor, at least twice within the first 3 weeks after birth, at 2, 4 (only first-time mothers) and at 8 months.

Edinburg Postnatal Depression Scale (EPDS) is used by the health visitors in assessing maternal depressive symptoms 8 weeks postpartum. EPDS has been shown to have a high sensitivity (68–95%) and high specificity (78–96%) against a clinical psychiatric diagnosis of depression. Total score ranges from 0-30 points.

The ADBB includes 8 items assessing the infant's social behavior (2-24 months) where the health visitor engages with the infant. The items, each rated 0-4 are: facial expression; eye contact; general level of activity; self-stimulation gestures; vocalizations; briskness of response to stimulation; relationship to the observer, and attractiveness to the observer. Low scores being optimal social behavior, and a cut-off ≥5 is recommended.

Using longitudinal regression models, we will examine whether ADBB and EPDS are associated to infant growth weight gain during the first year of life.

Notes

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Association of body composition with blood gene expression in late childhood - a study in the HELIX Project and the Generation R Study

Aim: To evaluate associations of body composition with blood gene expression in children.

Methods: Transcriptome-wide analyses of childhood BMI, total fat mass percentage (FM), and waist circumference (WC) were conducted in 901 8-year-old children from the Human Early-Life Exposome (HELIX) project. Whole blood gene expression was assessed with the Affymetrix Human Transcriptome Array 2.0 array. Gene-level replication analyses were performed using RNA sequencing data and BMI, FM and android fat mass from 172 10-year-old children from the Generation R Study. Functional pathway enrichment analyses were conducted with the enrichR tool and Kyoto Encyclopedia of Genes and Genomes (KEGG) database.

Results: After correction for false discovery rate (FDR) at 5%, BMI was associated with expression of 26 genes, FM with 18, and WC with 19 genes, with 17 common and 26 unique genes across the phenotypes. Top significantly enriched KEGG pathways included the NOD-like receptor signaling pathway, staphylococcus aureus infection and sulfur metabolism. In the Generation R Study, the discovery findings replicated in 3 out of the 18 genes associated with FM (LCN2, LTF, CRISP3), and in 6 out of the 19 genes associated with WC (LCN2, LTF, CEACAM8, MMP8, CRISP3, CAMP). None of the childhood BMI associated genes replicated.

Conclusion: Measures of childhood body composition were associated with blood gene expression. Further functional analyses of these genes may provide insights in potential biological mechanisms underlying the development or consequences of body composition.

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Nutrition, body composition, metabolism and overweight in infants, children and adolescent

During the past more than 25 years I have been involved in numerous observation- and intervention studies with infants, children or teenagers. My research interests have mainly been covert by the following topics: 1) Nutrition in infancy, childhood and adolescence. 2) Bone mineralization and body composition in children and adolescents. 3) Glucose and insulin metabolism in infancy, childhood and adolescence. 4) Obesity in infancy, childhood and adolescence. 5) Malnutrition in low-income countries. I also have an interest in clinical nutrition where one of the research topics is energy requirement in critically sick children.

In relation to overweight in infancy, childhood or adolescence, I am now involved in three studies: Generation Healthy Kids: Prevention of overweight and obesity among school-aged children, 2022-2026, (Clinical responsible), grant from NNF; APPROACH: 9-year follow-up of optimizing nutrition during pregnancy to improve offspring health 2023-? (PI); PREPARE CHILD: PRE-Pregnancy weight loss And Reducing Childhood overweight – a randomized controlled study. 2023-2027, (Sponsor-investigator), grant from NNF. In the last project, the main focus is on the mothers' pre-pregnancy weight as a predictor for risk of overweight in the offspring.

Furthermore, I am part of MILQ/EMILQ – Mothers, Infants and Lactation Quality: A Multicenter Collaborative Study with four countries 2017-2024 (Danish Co-investigator). Grant from Bill and Melinda Gates Foundation. One of our interest in this project is determinants of body composition in infancy.

Notes

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Breastfeeding as early prevention of obsity in disadvantaged families

Breastfeeding has a wide range of important health benefits for infants, including a reduced risk of childhood obesity. The benefits of being breastfed is however unequally distributed, as mothers experiencing social, psychological, or socioeconomic adversity are less likely to succeed with breastfeeding. Many struggle with obesity but also emotional stress, stigmatization, sense of failure and guilt, negative body images and lack of knowledge and support that may lead to misconceptions about infant feeding and growth.

Our extensive research with disadvantaged, new mothers, have explored e.g.:

- Women's experiences of new parenthood and engagement with health visiting services
- Key elements of supportive care and when parents feel supported
- When, how and for whom supportive adn proactive interventions work

Ethnographic field studies and realist evaluations with data collected through observations, interviews with more than 150 disadvantaged parents in Denmark

We found that disadvantaged mothers generally wish to and initiate breastfeeding. Their needs for support are however often complex and linked to the general adversities, they experience, but often not met by standard services. Health care interactions are often affected by feelings of being stigmatised or judged. Many do not thrive in standard programs but need more individualized, flexible and collaborative services, as well as access to specialized services, e.g. perinatal mental health services

Disadvantaged mothers face multiple barriers for breastfeeding at an individual, interpersonal, community, cultural and structural level. Change is needed to ensure more infants the benefits of breastfeeding.

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Bacterial composition in breast milk from women diagnosed with gestational diabetes mellitus in comparison to women without gestational diabetes mellitus: A pilot study

Background: Children born by mothers with gestational diabetes mellitus (GDM) have an increased risk of developing diabetes and/or obesity later in life. Furthermore, GDM mothers and their children have been shown to harbor a different gut microbiota compared to healthy controls, which may be associated with later health problems. As human breast milk (HBM) is one of the major contributors to establishment of infant gut microbiota, due to its content of bacteria and bacterial nutrients, it is important to establish whether mothers with GDM also have a different HBM microbiota that is passed on to their infants. We hypothesize that mothers with GDM have a different HBM microbiota, which results in an imbalance of the child's gut microbiota, thereby influencing the metabolic function and capacity of the child later in life. This study aims to investigate the HBM bacterial composition in women with and without GDM.

Methods: In this case-control study, a total of 47 women were included: 19 women with GDM and 28 women without GDM. Each participant collected a HBM sample 1-3 weeks postpartum, and the bacterial composition was examined through 16S rRNA gene sequencing targeting the V4 region.

Results: Relatively high abundances of Streptococcus and Staphylococcus were present in all the samples. Differences in bacterial composition between women with and without GDM will be investigated through alpha diversity, beta diversity, and differential abundance analysis.

Conclusion: If a GDM-associated HBM microbiota is present and is transferred to the child, then early modulation of the maternal microbiota profile could be a therapeutic target to prevent obesity in the child.

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Strength of protein leverage during development from infancy to adolescence

Protein leverage (PL) refers to a process where strong regulation of protein intake causes food intake to vary passively with variation in dietary protein density. The protein leverage hypothesis posits that in ecological settings PL may contribute to excess total energy intake (TEI) and obesity when the proportion of energy from protein (pP) is low. The role of PL from infancy to adolescence and associations with sex, puberty, and breastmilk exposure (BE) are unknown. Here we investigate PL in the Special Turku Coronary Risk Factor Intervention Project (STRIP) study.

A total of n=1062 infants aged 7 months participated for STRIP and were randomly allocated to an intervention with dietary counselling (n=540) or a control group (n=522). Data on nutrition and anthropometry assessed annually up to 20 years of age were used for age-stratified linear regression and mixture models, adjusted for sex, study group, fiber intake, and calculated energy expenditure. Change in leverage by age, sex, puberty and BE were evaluated by AIC.

The pP was significantly inversely associated with TEI at all ages and changed nonlinearly with ageing from 2 to 20 years (mean [SE] strength of protein leverage L=-0.35 [0.05] to L=-0.1 [0.04)], all p<0.01). The variance in TEI was associated primarily with pP, not with either fats or carbohydrates. PL did not change by sex, intervention, puberty or BE. The pP was not associated with BMI. Sensitivity analyses without underreporters (TEI/TEE <0.6), and in individuals with overweight confirmed the results.

This study provides consistent evidence for PL from infancy to adolescence. However, PL did not translate into increased adiposity in this cohort.

Notes

044 | **Uzdil, Zeynep**

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Is the mothers ‘ attitude in the nutrition process of children under five related to obesity? A pilot study from Turkey

Attitudes of families in the nutrition process can affect the food intake, eating habits, and nutritional status of children. It is known that the nutritional habits of families affect childhood obesity. In this cross-sectional study, the effect of mothers who are primary caregivers in the feeding process on child obesity was investigated.

The 187 volunteer mothers and their children (106 boys and 81 girls) were included. Body mass index (BMI) was calculated for mothers and their children. For children BMI cut off was considered according to WHO. The nutritional attitudes of the mothers were evaluated with the Feeding Process Mother Attitudes Scale. The scale is a 5-point Likert type consisting of 27 items and five sub-scale. The increasing score on the scale indicates that the problems related to mothers’ attitudes toward the feeding process have also increased.

Data analyzed with SPSS 21.0 statistical program. Mean age was 31.1±5.1 years for mothers and 28.6±15.0 months for children. Mean total score of the scale is 64.5±12.8. The mean mass index of mothers is 25.1±4.1 kg/m^2. There was no significant correlation between child’s BMI and mothers ‘ attitude score, but there was a weak positive correlation between the force-feeding sub-scale and the BMI of children. Children’s BMI was weakly correlated with the total duration of breast milk intake.

This study revealed that factors such as mothers’ attitudes toward the feeding process were associated with BMI. There is a need for studies and interventions that evaluate mothers’ nutritional knowledge in the prevention of childhood obesity caused by family attitudes toward breasting and the complementary feeding period.

Notes

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A low dietary protein intake seems related to impaired growth among 2–6-year-old obesity-prone children: Evidence for the protein leverage hypothesis

Background & Aims: The protein leverage hypothesis (PLH) proposes that strict regulation of protein intake drives energy overconsumption and obesity when diets are diluted by fat and/or carbohydrates. Evidence for the PLH is limited in children. Thus, we assessed how macronutrient composition is associated with the development of obesity in young children.

Methods: 553 children aged 2-6 years were included and followed for 1.3 years. Macronutrients (protein, fat, and carbohydrates) and energy intakes were assessed by 4-day dietary records. BMI z-score, fat mass %, waist- (WHtR) and hip-height ratio (HHtR) were measured as the main outcomes. Mixture models were used to explore interactive associations of macronutrient composition on outcomes, with results visualized as response surfaces.

Results: The distribution of protein intake (% of MJ, IQR: 3.2) varied substantially less than that for carbohydrate (5.7) or fat (6.3) intake (Fig 1). Energy intake varied inversely with dietary protein (% of MJ) ($L = -0.14$, $p < 0.001$). Compared to children with low fat or carbohydrate, children with a low dietary protein increased WHtR and HHtR most over the 1.3-year follow-up period (Fig 2), suggesting that low dietary protein can lead to excess growth.

Conclusions: In this study in children, protein intake was the most tightly regulated macronutrient, driving energy intakes, indicating the evidence for protein leverage. Increases in WHtR and HHtR were principally associated with the dilution of dietary protein, supporting the PLH. These findings add substantially to previous results based on cross-sectional studies and highlight the importance of protein in children's healthy diets.

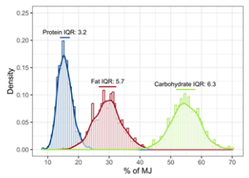


Figure 1. Distribution of macronutrient intake among preschool children

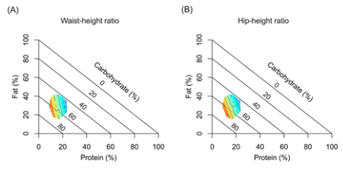
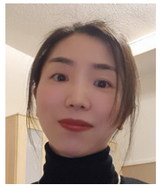


Figure 2. Right-angle mixture triangle for dietary macronutrient distribution and changes of waist- and hip-height ratio



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Maternal pre-pregnancy BMI, offspring adiposity in late childhood, and age of weaning: A causal mediation analysis

Maternal overweight or obesity is linked to offspring adiposity throughout childhood as well as adulthood, with various risk factors contributing to the intergenerational transmission of adiposity at different life stages. Infant feeding practices have been hypothesized to influence offspring's body mass index (BMI) later in life, and women with overweight or obesity tend to wean their infants earlier than women with healthy BMI. We, therefore, aimed to investigate how much early age of weaning mediated the maternal-offspring adiposity relationship.

The study included 4920 mother-child pairs from the Avon Longitudinal Study of Parents and Children birth cohort. G-computation was applied to estimate the natural direct (NDE) and indirect (NIE) effects, via the age of weaning (<3 months, 3 months, >3 months), of maternal pre-pregnancy overweight or obesity on offspring's BMI and fat mass index. The NDE of maternal overweight or obesity on offspring BMI at 17 years old was 2.63 kg/m^2 (95% CI: 2.27 to 2.99). The NIE via the age of weaning was 0.02 kg/m^2 (95% CI: 0.00 to 0.04), corresponding to 0.8% of the total effect. Similar results were observed for the offspring's fat mass index. The NDE and NIE were similar to the main analyses when we looked at the relationship stratified by breastfeeding status.

Our study found a minimal influence of age of weaning on the pathway between maternal and offspring adiposity, indicating the age of weaning may not be a key mediator. Future studies should explore other modifiable factors that could mediate the intergenerational transmission of adiposity.

Notes

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Mediating role of parental factors on socioeconomic inequalities in childhood overweight

Background: Socioeconomic health inequalities exist in childhood overweight. Understanding which factors mediate this relationship could reduce these inequalities. We aimed to assess to what extent and how parental health literacy and health behaviours mediate the relationship between parental socioeconomic status (SES) and childhood overweight.

Methods: Data were from the multigenerational prospective Dutch Lifelines Cohort Study. On average, the 6,683 children in the study aged 12.8 years (SD 2.6) at baseline and were followed up for 36.2 months (SD 9.3). We used causal mediation analyses to assess to what extent parental health literacy and health behaviours (smoking, diet quality, physical activity, and alcohol intake) mediated the relationship between parental SES (education, income, and occupation) and childhood overweight (age- and sex-specific definition).

Results: Parental education, income, and occupation reduced the odds of childhood overweight by 42% (per 4 years of education), 12% (per SD), and 20% (per SD), respectively. Smoking accounted for 6.6% (education) and 5.7% (occupation) of these pathways. Combined parental health behaviours explained 8.4% (education), 19.4% (income), and 9.8% (occupation) of these pathways. Overall, parental mediators jointly explained 10.8% (education), 27.4% (income), and 13.3% (occupation) of these pathways.

Conclusions: We found significant socioeconomic inequalities in childhood overweight; education being the most prominent. Remarkably, smoking was the most relevant mediator in this study. Therefore, smoking could be a target for interventions aimed at reducing socioeconomic inequalities in childhood overweight.

Notes

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Estimating Potential Causal Effects of Accelerometer-based Sedentary Time and Physical Activity on DEXA-measured Fat mass from Childhood through Young Adulthood: A 13-Year Longitudinal and Mediation Study

Background: Smart wearable devices can objectively assess movement behaviours such as sedentary time (ST), light physical activity (LPA), and moderate-to-vigorous physical activity (MVPA) but potential causal longitudinal relationships with directly measured fat mass from childhood through young adulthood is scarce. We examined the associations of cumulative ST, LPA, and MVPA from ages 11–24 years with repeated dual-energy Xray absorptiometry measured total body fat mass and mediation path analyses.

Methods: We studied 2457 children from the Avon Longitudinal Study of Parents and Children, UK who had data accelerometer-based movement behaviour and complete fat mass measures at ages 11, 15, and 24 years. MVPA was categorized into ≥60mins/day or less according to WHO PA guidelines. Longitudinal associations were examined with generalized linear-mixed effect models whereas mediation path was examined using structural equation models, adjusting for cardiometabolic factors.

Results: Among 2457 (61% female), ST increased while LPA and MVPA decreased, but fat mass increased during the 13 years follow-up. Cumulative ST from ages 11–24 years was directly associated with increased fat mass z-score (effect estimate 0.02 [95% CI 0.01 – 0.03] p<0.001). Cumulative LPA was associated with decreased fat mass (-0.01 [-0.02 – -0.01] p<0.001). Persistent MVPA of ≥60mins/day was associated with decreased fat mass z-score (-0.05 [-0.07 – -0.03] p<0.001). The inverse association of MVPA with fat mass was partially mediated by increased fasting insulin (7.4% mediation).

Conclusion: ST causally increases fat mass while LPA and MVPA decreases fat mass from childhood through young adulthood.

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Impact of breastfeeding as a protective measure against childhood obesity in Surat city

Childhood obesity has emerged as a significant public health concern worldwide, with long-term implications for both physical and psychological well-being. This study aims to investigate the impact of breastfeeding on the prevalence of childhood obesity in Surat city, exploring the association between breastfeeding practices and the weight status of children. Using a cross-sectional design, data was collected from a representative sample of children aged 2 to 6 years in Surat city. Information on breastfeeding duration, exclusivity, and initiation was obtained through structured questionnaires administered to mothers or caregivers to determine the prevalence of childhood obesity. Socioeconomic and demographic factors and anthropometric data were also assessed as potential confounding variables.

Preliminary findings indicate that breastfeeding plays a crucial role in protecting against childhood obesity in Surat city. Children who were exclusively breastfed for at least six months exhibited a significantly lower prevalence of obesity compared to those who received formula or supplementary feeding. Further analysis revealed that early initiation of breastfeeding within one hour of birth correlated with a lower likelihood of childhood obesity, emphasizing the importance of timely breastfeeding practices.

These results highlight the potential of breastfeeding as a cost-effective and accessible protective measure against childhood obesity in Surat city. Public health interventions aimed at enhancing breastfeeding practices could lead to substantial benefits in curbing the rising prevalence of childhood obesity in Surat city.

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Comparing the use of food and physical activity parenting practices: Parents of children with overweight and obesity versus parents of children with a healthy weight

Paediatric overweight and obesity are caused by a complex imbalance between energy intake and expenditure. Parents may influence this imbalance through energy balance-related parenting practices. This study aims to compare the use of energy balance-related parenting practices between parents of children with overweight and obesity and children with a healthy weight.

This study compares energy balance-related parenting practices among a group of parents with children with overweight and obesity at the start of a lifestyle intervention (N=107) and children with a healthy weight (N=137). Specifically, it compares the feeding practices 'overt control' (open control over eating), 'encouragement', 'instrumental feeding', 'emotional feeding', and 'covert control' (hidden control over eating), as well as the physical activity parenting practice 'promoting physical activity'. Multiple regression analyses are used to calculate associations between child weight groups and parenting practices when corrected for children's characteristics.

Parents of children with overweight and obesity reported significantly different scores on control over eating practices than parents of children with a healthy weight, namely a significantly higher score on covert control (B=0.397, S.E. 0.123, p=0.001) and a significantly lower score for overt control (B=−0.136, S.E. 0.068, p=0.046). Covert control is reported more, while overt control is reported less in parents of children with overweight and obesity compared to parents of children with a healthy weight, even after correction for the child's, family, and maternal characteristics.

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Machine learning and evaluation of obesity causes

Background: Many potential causes of obesity in children have been investigated, but the state of the meta-evidence is still unclear. Research has focused strongly on certain elements, such as diet and physical activity, while neglecting other elements, such as chemical exposures. Interactions between factors are under-researched. Machine learning may be able to grasp the complexity related to the development of obesity and highlight important putative determinants of obesity and interactions among them that are currently unknown.

Aim: To list determinants associated with obesity in childhood and adolescence; to use machine learning techniques to identify examined and less examined putative determinants of obesity in children at specific ages; and to test associations between selected determinants and developmental trajectories across childhood within a causal framework.

Research plan: First, an umbrella review will be conducted to list well-researched and less researched putative determinants of obesity in children and adolescents. With this knowledge, putative determinantes will be selected and their association with obesity in childhood will be investigated through machine learning. Since machine learning can only find associations, there is need for further epidemiological investigation to evaluate the causality of the associations. Since some determinants only affect obesity in certain ages, whether the exposures of interest also affect the odds of obesity at a higher age will be investigated.

The project will use data from the Danish National Birth Cohort and the Diet, Cancer and Health – Next Generations cohort."

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Examining parents' experiences and challenges of feeding preschool children with avid eating behaviour

Avid eating behaviours (e.g., greater food responsiveness) have been linked to child obesity. Parent feeding practices are modifiable components of a child's food environment and may be key levers for behaviour change in tailored interventions to support parents of children with avid eating behaviour. This study explored parents' experiences of feeding children with avid eating behaviour and to understand any challenges experienced in this context. Interviews with parents (N=15) of a preschool child (3-5 years) who was identified as having an avid eating behaviour profile explored how children's avid eating manifests, the parental feeding practices used to manage avid eating behaviour, and the perceived effectiveness of these strategies.

Reflexive thematic analysis was used, and four themes were generated. Theme one ('Have they got worms?') captures the complex ways avid eating behaviour manifests. Theme two ('Parenthood as a duty') illustrates how parents' perceived responsibilities shape their feeding practices. Theme three ('Lifelong habits') captures parents' use of responsive feeding practices to support children's healthy relationship with food. Theme four ('Picking battles') captures the structure- and indulgence-based feeding practices used to manage children's avid eating. This study provides an in-depth understanding of the complex ways that children's avid eating behaviour manifests, and the strategic and creative parental feeding practices use to manage these behaviours. These findings are valuable for informing the development of support resources for parents to help their children with avid eating behaviour to develop a healthy relationship with food.

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Early-life gut microbiota and childhood growth: A comprehensive study

Obesity is a global health concern with increasing evidence suggesting that the gut microbiota may play a role in its development. While substantial research has explored the connection between the gut microbiome and obesity in adults, limited attention has been given to understanding the early-life associations.

Using data from the Copenhagen Prospective Studies on Asthma in Childhood2010 cohort, our study analyzed the gut microbiota of 700 children at different time points over their first six years of life. Fecal samples were 16S rRNA gene sequenced to evaluate microbial diversity, overall composition, and individual taxon abundances. We assessed outcomes including BMI WHO-z-scores (zBMI) spanning 0-10 years, overweight (zBMI>1.04) and obesity (zBMI>1.64) at age 10, the timing of adiposity rebound, and body composition at age 6 using dual-energy X-ray absorptiometry.

In contrast to some existing literature, our findings reveal that the early-life gut microbiota's diversity, composition, and taxon abundances were not consistently associated with current or later BMI z-scores, overweight, obesity, adiposity rebound, or body composition during childhood. These results suggest that the presumed associations between gut microbiota and adult obesity may not be established during early childhood.

In conclusion, our comprehensive study underscores the complexity of the relationship between early-life gut microbiota and childhood obesity. These findings contribute to the evolving understanding of obesity's multi-faceted etiology and highlight the need for further research to elucidate the intricate interplay between gut microbiota and childhood growth patterns.

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Digital screen use during recess and physical activity behaviors in 10-17-year-old adolescents

Background: In many countries, the use of digital devices in school is widely debated. This study aimed to investigate the association of screen use during recess with various objectively assessed physical activity behaviors observed during the same periods.

Methods: In this cross-sectional study, we utilized data from 5th-9th-grade students participating in the PHASAR study, a population-based study including 1347 adolescents from 28 schools. Based on accelerometry data from devices worn on the thigh and lower back, we classified behaviors such as sitting, standing, and walking and time spent on activity with different intensities in accordance with each adolescent's school timetable. Participants self-reported their frequency of screen use during recess using a 5-point Likert scale. We also assessed activity behaviors during leisure and used these as negative control outcomes to address possible bias.

Results: Greater frequency of screen use during recess was associated with a significantly higher proportion of time spent sitting, and a lower proportion of time engaged in physically active behaviors such as walking and running, as well as moderate-to-vigorous intensity activities. All activity outcomes demonstrated consistent dose-dependent associations in young and older adolescents and across sex. In the negative control outcome analyses, no association was observed between screen use during recess and any leisure time activity outcomes.

Conclusion: This study revealed a dose-dependent association between frequent screen use during recess and lower physical activity, suggesting a need for policy regulations on device use during breaks to promote adolescent activity.

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Screen Time: The 'Digital Diet' impacting cardiometabolic health in childhood and adolescence - Unveiling the metabolic signature in two mother-child cohorts

Background: The significant increase in screen time among children and adolescents has raised concerns about its short and long term health impacts including cardiometabolic risk (CMR).

Methods: Screen time and CMR factors encompassing the metabolic syndrome, insulin resistance, inflammation, lipoproteins and obesity were evaluated at ages 6, 10, and 18 years in the Copenhagen Prospective Studies on Asthma in Childhood (COPSAC) 2010 and 2000 cohorts. Our longitudinal study accounted for relevant covariates including objective measures of physical activity, sleep patterns, dietary patterns and puberty.

Results: In both the COPSAC2010 and COPSAC2000 cohorts, screen time was found to be significantly associated with an elevated total CMR ($p=0.008$, $p<0.001$). In childhood, detrimental effect-modifiers of this relationship were reduced sleep duration ($p=0.019$) and later sleep onset ($p=0.041$). Additionally, a Western dietary pattern score was found to partially mediate the impact of screen time on CMR, accounting for 14.8% of the effect ($p=0.022$). We employed a machine learning model trained in COPSAC2010 to uncover a unique metabolic signature associated with screen time, which despite significant cohort characteristic differences, predicted actual screen time in COPSAC2000 ($p<0.001$).

Conclusion: Our study, conducted in two independent mother-child cohorts, identified strong associations between screen time and CMR factors. The potential utility of machine learning approaches in identifying key metabolic signatures of screen time may prove invaluable in future research aimed at identifying individuals at risk of high screen time use and may inform targeted interventions.

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Lockdown effects on cardiometabolic health in children: Findings from a Prospective Cohort Study

Background: Cardiovascular disease begins to develop in childhood with known adult cardiometabolic risk (CMR) factors serving as key predictors. The COVID-19 lockdown in 2020 provided a natural experiment to assess potential impact of lockdown measures on CMR in children.

Methods: We evaluated associations between lockdown and CMR factors in the Copenhagen Prospective Studies on Asthma in Childhood 2010 cohort of 700 mother-child pairs at age 10 years. Here, we performed a comprehensive cardiometabolic assessment, including anthropometric measurements, blood pressure, lipid profiles, and glycemic markers. Additionally, lifestyle factors including objective assessment of physical activity levels, sleep patterns, and dietary patterns were evaluated.

Results: 367 of the cohort children (61%) completed the 10-year visit after the lockdown. In fully adjusted models, we found significant decreases in glucose (β -0.12, p=0.002) and HbA1c (β -0.79, p=0.003) following the lockdown. Conversely, HOMA-IR, a measure of insulin resistance, showed significant increase in the post-lockdown group (β 1.11, p=0.021). In sensitivity analysis, the decline of glucose and HbA1c were significantly greater immediately after the lockdown than later. Furthermore, the post-lockdown group had a near-significant decrease in their total CMR z-score (β -0.43 p=0.054). No significant associations existed between the pre- and post-lockdown groups in terms of lipid, blood pressure, or anthropometric measurements.

Conclusion: We found that the COVID-19 lockdown was associated with significant differences in children's glycemic regulation independent of lifestyle factors in a general population cohort.

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Local partnerships to address urban drivers of childhood obesity

Cities Changing Diabetes is a global public-private partnership programme focused on driving systemic change to reduce health inequities by enabling partners at city level to understand and address the underlying drivers of serious chronic diseases. Since 2014, the programme has provided a platform for cities to learn, share and act to integrate health into all policies across departments and co-create local health promoting initiatives together with communities. The program includes more than 45 cities and 200 partnership organizations (city leaders, health authorities, academia, patient associations, health providers and community groups).

Cities Changing Diabetes is undergoing a new strategy process, including a significant increased focus on innovative solutions for childhood obesity prevention, targeting its multi-dimensional determinants. We will a pilot deep-dive, place-based approach in 3-5 geographies to design locally relevant, integrated, and sustainable community-level solutions. The local initiatives are supported by financial investment, a global secretariat and global experts that serve to advise, share knowledge across sites, and identify solutions to scale to additional cities through the Cities Changing Diabetes global network. A robust system of monitoring and evaluation will be integrated into the design of specific projects from the outset, so that an iterative approach can be taken to continuously adapt and improve the programme as new evidence emerges. The programme aims to identify interventions that have an impact on environmental, behavioural, health, and socioeconomic outcome indicators related to childhood obesity.

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Long-term change in BMI after family-centered lifestyle intervention for children with obesity

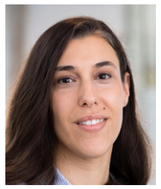
Objective: We investigated change in BMI, including the change in different socioeconomic groups, after participating in family-centered lifestyle interventions compared to a no-intervention group.

Methods: In this cohort study, we included children living with obesity between 2010-20 from the cities Aarhus and Randers, Denmark. Data on anthropometry were combined with socioeconomic information obtained from national registers. An adjusted mixed effect model was used to model changes in BMI z-score and stratification to investigate modifications in subgroups.

Results: With a median follow-up of 2.8 years, 703 children participated in an intervention (445 from Aarhus; 258 from Randers) and 2,337 did not. Children in both interventions experienced a similar and significant short-term reduction in BMI z-scores during the first 6 months compared to the no-intervention (Aarhus: -0.15 per year, confidence interval (CI):-0.04;-0.29 and Randers: -0.24 per year, CI:-0.14;-0.34). However, only children from the Randers intervention maintained the reduction (Randers vs. no-intervention, difference per year: -0,05; 95% (CI):-0.08;-0.02, Aarhus vs no-intervention: 0.01 per year, CI:-0.01;0.04).Family income below the median, immigrant background or receiving intervention less than one year were all associated with annual increase in BMI z-score.

Conclusion: A similar short-term reduction in BMI z-score were observed for both interventions but only the longer intervention in Randers maintained the reduction over time. Family income below the median, immigrant background, or receiving intervention less than one year were associated with increasing BMI z-scores.

Notes



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Common actions for the prevention of overweight and obesity among children in the Nordic countries

Childhood obesity is a most serious public health challenge, and the increasing prevalence of overweight and obesity among children in the Nordic countries is worrying. Children with overweight and obesity have a higher risk of carrying these conditions into adulthood, and recent evidence also indicates an association between the prevalence of obesity in childhood with a higher risk for developing some cancer forms in adulthood.

The Nordic countries' cancer societies are therefore developing a set of common Nordic recommendations for the prevention of overweight and obesity among children, with particular focus on actions that will mitigate the societal and structural causes of overweight and obesity.

The project's first element is a systematic review of the evidence on policy initiatives that cover such subjects as: taxes and fiscal policies; marketing restrictions and regulations; product labelling; product reformulation; early childhood prevention; availability and affordability; public standards; school health; and health literacy. The common Nordic recommendations for the prevention of overweight and obesity will be based on results from the review.

A second element is a survey of the Nordic populations' support for the implementation of the recommended measures and policies aimed at the prevention of overweight and obesity among children. The project's results and recommendations will be presented at a high-level political conference in November 2024.

We will present preliminary results for the systematic review and the development of the Nordic survey at the Science Cluster conference on Prevention of Childhood Obesity.

Notes

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Feeding styles, the use of food to soothe children, and the food selection tendency in fathers and mothers with a children obesity prevention perspective

Childhood obesity is a complex challenge affecting all societies. Studies suggest that parent-child interactions during meals could determine children eating behaviors. Results about parents' feeding styles and practices with children's BMI are mixed, but it has been found that children's relationship with food and their preferences could be related to them. The vast majority of studies have been carried out on women, existing a sex gap in the literature.

We aim to explore associations between parental feeding styles and the type of food used to soothe (FTS) their children, and possible children's BMI differences depending on parental feeding styles and the FTS offered, including men and women. This cross-sectional study included parents of toddlers from different regions of eastern Spain. X2 tests were performed to explore associations between variables, and t-student and ANOVA to determine differences between the type of FTS, parental feeding styles, and children's BMI. The main feeding style in men was authoritarian and indulgent in women. In fathers, FTS practice was more common in the authoritative and less in the authoritarian style.

In women, we found differences between FTS and their feeding style: authoritative offered more cereals, vegetables, and juices, and the uninvolved yogurts, sweets, and snacks. Men soothe with more bakeries and snacks than women. From fathers' data, we found differences in children's BMI according to the use of milk, bread, or bakeries. In conclusion, the results showed differences in parents' feeding behaviors, attitudes, and tendencies in using FTS depending on being fathers or mothers.

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Which types of food do children themselves perceive as tasty and healthy?

Objective: The aim of this project was to investigate what types of food children perceive to be healthy and tasty, and how these may be influenced by gender, age, and parents' educational level.

Methods: A total of 248 Danish children aged 8 to 10 years participated. They were divided in three experimental groups and asked to draw their perception of healthy foods, tasty foods, and favorite things, respectively.

Results: In the healthy group, children mostly draw food items from the categories ''fruits'' (258 items), and ''vegetables'' (244 items), followed by ''bread'' (10 items), and ''water'' (10 items). With increasing age or shorter parental education, children drew less healthy food items.

In the tasty group, children draw food items from the categories ''fast food'' (172 items), ''desserts and sweets'' (110 items), ''savory (fatty) meal'' (67 items), ''fruits'' (64 items). ''Sugary beverages'' were drawn a total 33 times, and ''vegetables'' 31 times. For tasty foods, boys drew mainly unhealthy food items including meat, and fatty foods whereas girls mainly drew fruits and vegetables.

Specific brand names were given 44 times. The brands most frequently mentioned were McDonald's, Prime, Pepsi Max, Faxe Kondi, and Lego.

Discussion and conclusion: Understanding children's preferences may help identify targets for healthier diets. Interestingly, only few healthy food items were considered tasty among boys, and the majority of brands mentioned were related to unhealthy snack-like products and foods. Exposing children to a wide palette of foods that are both healthy and tasty may open their minds for tasty foods that are also healthy.

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School meals in elementary schools – Do they meet the Croatian National Guidelines?

Introduction: Croatian National Guidelines for School Meals in Elementary Schools was established in 2013.

Aim: To evaluate food content of school meals six years after guidelines implementation.

Methods: Cross sectional survey among all public elementary schools in Zagreb (N = 108), with 65 487 students. Menus for a typical school week were collected from school's web pages.

Key points from guidelines were evaluated; types and frequency of foods served; 8 food groups that should be offered every day, and 6 food groups that should be avoided or served sparingly.

We calculated the compliance of schools with regard to each food group category and the number of food group recommendation that are met by each school.

Results: Menus were collected from 100 schools (response rate 92.5%).

Many schools offer sweetened beverages (95%) with 38% of schools offering them at least once a week.

Few schools (18%) serve plain milk or yoghurt daily, and many serve fruit yogurts (32%), chocolate milk (31%) and pudding (27%).

Fruits and vegetables are served daily in 25% and 39% of schools, respectively.

Most schools (72%) offer daily serving of protein source, and many (64%) offer 1-2 servings of fish per week.

Fast food items are served at least once a week: pizza (22%), hot dogs (19%) and "burek" (16%).

Pastry and cookies are offered in 88% of schools at least once a week.

Most schools have low or intermediate compliance: out of 11 guideline recommendations, half (57%) meet only up to 5, and most (93%) meet only up to 2 recommendations.

Conclusion: Elementary schools in Zagreb do not sufficiently meet Croatian nutritional standards after 6 years of Guidelines launching.

Notes

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Identifying an avid eating profile in childhood: Associations with temperament, feeding practices and food insecurity

Existing public health recommendations and interventions to reduce adiposity risk in children are generic and fail to address the significant variations in children's eating behaviours that are linked to an increased risk of overweight and/or obesity.

This study aimed to identify a specific eating behaviour profile associated with a high food approach in children and investigate how other key predictors of children's eating behaviour, such as child temperament, food insecurity, and parental feeding practices, may differ across the identified profiles. The researchers conducted an online survey involving 995 parents or caregivers residing in England and Wales (Mage = 35.4 years, 80% female), who provided information on their 3-5-year-old child's eating behaviour using the Child Eating Behaviour Questionnaire (Mage = 48.8 months, 52% female). Using Latent Profile Analysis, the researchers identified four distinct eating profiles among the children: (a) avid eating, (b) avoidant eating, (c) happy eating, and (d) typical eating. Avid eating, observed in 21.9% of the children, was characterized by higher levels of food responsiveness, enjoyment of food, eating speed and emotional overeating, along with lower satiety responsiveness and food fussiness. Children in the avid eating profile were reported to exhibit higher levels of surgency and experience greater food insecurity compared to children in the other eating profiles. Parents of children in the avid eating profile reported using food for emotional regulation and restricting food for health and weight management purposes more than parents of children in the other eating profiles.

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A critical review of opportunities, within a complex food system, to boost food literacy and foster healthy eating behaviours in childhood and adolescence

This work offers a conceptual framework to enhance our understanding of how the eating habits of young people are shaped and identifies key approaches that should be adopted across different sectors, providing implications for societal, public health and policy changes to reduce childhood obesity. In this comprehensive review, the authors explore several factors that influence eating habits, including individual factors such as physiological and psychological aspects, as well as factors within personal and socio-cultural food environments, such as the external food environments and the food supply chain. The proposed food systems model also draws attention to the importance of food literacy competencies in childhood and adolescence. As children grow and develop, they acquire various food literacy competencies, which are influenced by their cognitive abilities, skills, and experiences. This work provides a detailed account of how diverse food literacy competencies (relational, functional, and critical) are cultivated during childhood and adolescence to provide the valuable tools necessary to navigate the complexities of the food system.

The work highlights the importance of adopting multisectoral approaches that consider the various dimensions of food literacy and foster the development of these competencies in children and adolescents. The paper concludes by suggesting how to enable children and adolescents to actively participate in sustainable food systems, fostering healthier dietary behaviours that can be sustained throughout their lives and positively impacting society's overall health.

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Association between individual and environmental factors with Body Mass Index for Age Z-Score in female adolescents living in North-West of Iran

Purpose: The aim of the present study was to investigate the association of individual, and environmental indicators with Body Mass-Index-for-Age-Z-Score (BAZ) of female adolescents living in the North-West of Iran.

Methods: In this cross-sectional study, 380 female adolescents aged 16-18 years selected from two major ethnic groups (Azeri and Kurd) in Urmia city selected by stratified cluster sampling method. Thirteen high schools were selected across all municipality zones. BAZ was calculated by Anthro-Plus software. Home environment features (Physical activity facilities, Television, computer games, and social media use, Food consumption habits and Family rules) and school environment features (Socio-economic status, Physical activity facilities, Food consumption habits in school) were evaluated by two separate self-constructed questionnaires via interview with adolescents and schools' deans, respectively.

Findings: Azeri adolescents had parents with higher education and job level and higher socioeconomic status (SES) compared to Kurds. Higher percent of Azeri adolescents were obese than their Kurd counterparts. No association was found between individual factors and BAZ in each ethnic group. Considering home environment characteristics, in Kurd adolescents, the maternal occupational level was positively associated with BAZ. With regard to school environmental features, accessibility of physical activity facilities in school was inversely associated with BAZ only in Kurds ($p<0.05$).

Conclusion: Adolescents with lower SES, as observed in Kurd participants, may be more dependent to school and outside home facilities for physical activity and healthier life style.

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Sleep and Childhood-onset Obesity: Associations with appetite and physical activity – the RESETTLE trial

Background: Insufficient sleep in children has become more frequent in modern society, and studies have linked poor sleep and obesity. Insufficient sleep may also be associated with increased appetite and physical inactivity, making it an important target in obesity treatment.

Aim: To investigate if poor sleep was associated with increased appetite and physical inactivity in young adults with childhood-onset obesity.

Methods: 87 young adults (mean age: 22.7±2.6, BMI: 39.7±5.8, 44 women) with childhood-onset obesity were recruited from The Children's Obesity Clinic, Holbaek Hospital. Sleep efficiency (time asleep/time in bed*100) and physical activity from 7-day accelerometry from wrist-worn trackers and self-reported sleep quality (Pittsburgh Sleep Quality Index, PSQI) were measured. PSQI >5 defined poor sleep quality, and PSQI ≤5 good sleep quality. Appetite ratings (visual analog scales during a 3h liquid meal test), self-reported physical activity (International Physical Activity Questionnaire), and anthropometrics were assessed.

Results: Poor sleepers (n=66, 76%) had a lower sleep efficiency (82 vs. 93%, p<0.001), higher BMI (40.4±5.9 vs. 37.8±5.5 kg/m^2, p=0.040), larger waist (119.1±13.4 vs. 110.4±14.0 cm, p=0.017), took 28% fewer daily steps (6267 vs. 8737, p=0.013), and scored lower in overall satiety and higher wanting of high-fat foods than good sleepers (n=21, 24%).

Summary: Poor sleep is highly prevalent and associated with the degree of obesity, increased appetite with cravings for fatty foods, and lower physical activity among young adults with childhood-onset obesity. Addressing sleep is crucial in the treatment of childhood-onset obesity.

NCT05574439

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What does body weight mean for dropout and academic performance of adolescents? A prospective cohort study of 65,233 high school students

Background: A young person with high weight can experience external and internal stigma, resulting in feelings of low self-esteem and lack of confidence. This may negatively affect school connectedness and academic performance, leading to dropout or graduating with a suboptimal result. Not receiving education beyond elementary school associates with chronic diseases and early mortality. Indeed, interventions to improve secondary educational outcomes presents the single best investment for health and wellbeing of adolescents. Thus, it is important to establish if body weight associates with high school dropout and academic performance.

Methods: We conducted a prospective cohort study including 65,233 Danish students aged 15-20 years. Weight status was operationalized using the body mass index (BMI). Main outcome measures were high school dropout and grade point average, obtained from national registers. We used Cox regression (dropout) and linear regression (for grade point average).

Results: BMI associated with high school drop out in a dose dependent manner. In contrast, BMI associated inversely with grade point average meaning that those with high weight generally received lower grades. Dropout was considerably more frequent in males compared to females and females generally received higher grades. Nevertheless, associations between BMI and dropout and grade point average were similar for males and females.

Discussion: Weight status may interfere with educational success in young people and thus their prospects in life. To prevent detrimental effects of weight stigma, elucidating the mechanisms underlying these findings are crucial.

Notes

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Physical activity level in adolescence is associated with maternal educational and physical activity level in pregnancy: A Danish National Birth Cohort Study

Background: Parental socio-economic status and physical activity (PA) in pregnancy may influence offspring adolescent PA, but results are mixed.

Objective: Examine whether maternal educational level and PA in pregnancy determine offspring PA at aged 14y.

Methods: We identified 34,222 mother-child pairs from the Danish National Birth Cohort with information on education and PA in pregnancy retrieved from a telephone interview in 12th week of gestation in 1996-2002; as well as information on child PA assessed by an online questionnaire at age 14y. Logistic regression analysis was performed to investigate the associations with adjustment for pre-pregnancy BMI, maternal age, self-rated health, healthy eating index, asthma, smoking, working hours, parity, cohabitation, child sex, and child BMI at age 14y.

Results: Compared with mothers with >4y of vocational training, there was increased odds ratio (OR) of the children not fulfilling PA recommendations (PAR) (60 min/d) when the mother had 2-3y vocational training, ≤1y of vocational training, or no vocational training, respectively (OR 1.23, 95%CI 1.16-1.14; OR 1.33, 95%CI 1.19-1.49; OR 1.47, 95%CI: 1.32-1.64). We found increased odds of the children not fulfilling PAR (60 min/d) if the mother did not fulfill PAR (30 min/d) in pregnancy, compared to if the mother did (OR 1.32, 95%CI 1.18-1.49). Adjustments did not alter the results and the associations did not differ between boys and girls.

Conclusion: Results from this large population-based longitudinal study support that adolescent PA seems to be determined by maternal educational level and PA. This is of importance in future obesity prevention and intervention studies.

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Artificial sweeteners in pregnancy and childhood obesity

Background: Artificial sweeteners (AS) are increasingly being used to reduce energy intake, but recent studies suggest that consumption during pregnancy may impact the offspring's weight.

Objective: To examine the previously proposed association between prenatal AS exposure and childhood obesity from birth to 7 years in the Danish National Birth Cohort (DNBC).

Methods: 101,042 mother-child dyads were enrolled in the DNBC from 1996-2002. 72,821 women completed a Food Frequency Questionnaire around gestational week 25 reporting daily, weekly, or monthly consumption of 250ml sodas sweetened with AS or sugar. Anthropometric measurements of the children were obtained at birth, 5 and 12 months, and 7 years. Multivariate logistic regression was performed to investigate the odds ratio (OR) for overweight in relation to maternal consumption of AS. The analyses were adjusted for parental and early life risk factors for childhood overweight.

Results: We found an increased risk of large-for-gestational age (LGA) birth weight, overweight at 12 months (OR 1.23, 95% CI: 1.05 to 1.43) and 7 years (OR: 1.58, 95% CI: 1.36 to 1.83) in children, whose mothers reported drinking ≥1 sodas with AS daily during pregnancy compared to no consumption. The association weakened after adjustment for parental and early-life risk factors for childhood overweight. The risk for LGA persisted after adjustment (OR 1.48, 95% CI: 1.08 to 1.99).

Conclusion: We found that exposure to AS in utero increases the risk of childhood overweight. When adjusting for known risk factors for overweight, associations weakened, suggesting confounders might be a contributor.

Prevention of childhood obesity before and during pregnancy

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The relationship between periodontitis, obesity and inflammation in the first trimester of pregnancy: A cross-sectional analysis from the PROBE-intervention study

Objective: To reveal a possible interplay between periodontitis (PE), obesity and high-sensitivity-serum-C-Reactive-Protein (hs-CRP) in women at first pregnancy trimester.

M&M: This study was conducted as part of the PROBE study, which investigates if periodontal treatment during pregnancy can reduce systemic inflammation and risk of adverse birth outcomes. First-trimester pregnant women from Holbæk and Nykøbing Falster Hospitals, Denmark were included, and baseline data from the first 81 women enrolled was used.

Self-reported pre-pregnancy BMI defined pre-pregnancy obesity. Serum hs-CRP levels were determined from a venous blood sample at pregnancy week 11-13. Hs-CRP was dichotomized at 2.9 mg/L, into elevated and normal CRP. In week 13-20, full-mouth periodontal examination was conducted to diagnose participants with PE. Multivariable logistic regression and interaction analyses assessed association of PE with obesity and elevated hs-CRP.

Results: Prevalence of PE in the sample population was 32.1%. Mean BMI in women with PE was 27.5 kg/m^2 (SD:4.5) and in those without PE was 26.5 kg/m^2 (SD:6.6). Women with PE had OR=2.06 (CI=0.71-5.96) for elevated CRP vs women without PE. Obesity associated with elevated hs-CRP before (OR=1.21; CI=1.07-1.38) and after adjustment for PE (OR=1.20;CI=1.06-1.36). No interaction between PE and obesity was seen in relation to elevated hs-CRP (OR=0.86,CI=0.65-1.13).

Conclusion: In participants, PE associated with a 2-fold non-significant higher Odds of elevated CRP, and may be explained by the small sample size. Obesity associated with higher Odds of inflammation but there was no significant interaction between obesity, PE and hs-CRP.

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Obstetrical and neonatal complications among pregnant women with overweight or obesity on a high-protein low-glycemic index diet

Background: A higher risk of obstetrical and neonatal complications is seen for women with maternal overweight compared with women with normal weight. We examined the effect of a high-protein low-glycemic index diet (HPLGI) on the risk of obstetrical and neonatal complications.

Method: A total of 208 pregnant women with pre-pregnancy overweight or obesity (BMI 28-45 kg/m^2) completed the "An optimized programming of healthy children (APPROACH)" randomized controlled trial with a live birth. Randomized to an HPLGA - or a moderate-protein moderate-glycemic index (MPMGI) diet from gestational week 15 and until birth.

Results: For women on an MPMGI diet, 27.9% had a Cesarean section (CS) (acute or planned vs vaginal birth) compared with 15.4% on the HPLGI diet (P = 0.029). Women on an MPMGI diet were more likely to experience prelabor rupture of membranes (PROM) than women on an HPLGI diet (10.0% vs 1.9%, respectively, P = 0.017). No other examined obstetrical complication differed between the groups nor when pooling for any obstetrical complications (P = 0.072). When examining neonatal outcomes, we found no significant differences between the groups; birth weight, preterm birth <37 or <34 weeks, apgar score at 5 minutes, apgar score <7 at 5 minutes or any neonatal admission. There was no difference when pooling neonatal complications (P = 0.973).

Conclusion: We found a lower risk of CS and PROM for women on the HPLGI diet. No other differences in the risk of obstetrical and neonatal complications were observed.

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Prevention of childhood obesity before and during pregnancy

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Impact of birth weight on the relationship between obesity and type 2 diabetes

Background: Birth weight has been linked to obesity, a main risk factor for type 2 diabetes. However, the relationship between obesity and risk of T2D may differ depending on birth weight. We aimed to assess whether this relationship is modified by birth weight.

Methods: We analyzed data from 219,817 participants of European ancestry from the UK Biobank (application ID:32683). 10,744 individuals developed type 2 diabetes during a median follow-up of 12.9 years. BMI was measured at baseline, while birth weight was self-reported and additionally assessed by a polygenic score comprising 173 birth weight-increasing loci. We conducted Cox-regression analyses to examine the association of obesity with the risk of type 2 diabetes in individuals with low, normal or high birth weight.

Results: Compared to individuals with normal birth weight and BMI, individuals with obesity had 12.82-fold, 9.45-fold and 7.77- fold higher risk of type 2 diabetes if birth weight was low, normal and high, respectively. When we compared diabetes risk in individuals with obesity to that of normal-weight individuals within the same birth weight category, the risk increase was consistent across low, normal or high birth weight categories: 7.89-fold [6.52, 9.48]; 9.48-fold [8.76, 10.26]; and 8.43-fold [6.89, 10.33] higher risk of type 2 diabetes, respectively. Among individuals with obesity, 14.9% of those with low birth weight developed type 2 diabetes, compared to 11.2% of those with high birth weight.

Conclusion: Birth weight does not modify the association between obesity and the risk of type 2 diabetes. It is important to prevent excess weight gain to prevent diabetes, regardless of birth weight.

Notes

Prevention of childhood obesity before and during pregnancy

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Fetal growth rate, growth in first year of life and childhood overweight

Introduction: There is an increasing focus on the first 1,000 days of life, from conception to two years of age, as a period of importance in future weight and metabolism, and both fetal and childhood growth has been associated with being overweight later in life.

The aim of this study is to describe the interaction between fetal and infant growth in relation to later risk of overweight.

Methods: We used routinely collected data from Aarhus Municipality Healthcare Service on child growth and combined these with information on fetal growth and maternal health during pregnancy from electronic patient records at Aarhus University Hospital. The outcome was overweight at age 7.

Exposures were fetal growth trajectories grouped in slow, average, and fast growth. Using latent class trajectories of infant BMI z-scores, we identified three classes of growth; average, catch-up, and catch-down. By combining fetal and infant growth groups we created nine groups reflecting the combinations.
We used logistic regression to investigate the association between fetal and infant growth and being overweight at age 7.

Results: We identified 6220 children with complete data.
Both fetal growth and infant catch-up growth was independently associated with overweight (odds ratios: 1.15 per 10g/week increase (95% CI: 1.09-1.21) and 1.33 (95% CI: 1.00-1.77), respectively). When combined, we found that infant growth modified the association between fetal growth and overweight with distinct patterns resulting in different risk.

Conclusion: Fetal and infant growth were independently associated with overweight but distinct combinations of fetal and infant growth showed marked differences in risk.

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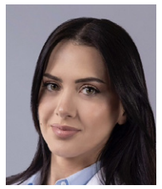
Fat mass in adult offspring of women with gestational diabetes mellitus or type 1 diabetes

Introduction: Studies have shown increased childhood obesity in offspring of women with diabetes, but no studies have evaluated fat mass in adult offspring. We aimed to investigate fat mass percentage in adult offspring of women with gestational diabetes mellitus (GDM) or type 1 diabetes in pregnancy compared to controls.

Methods: A follow-up study of 597 18-27 year old offspring of women with either GDM or type 1 diabetes born at Rigshospitalet, Denmark in 1978-1985. Participants were divided into four groups: 1) O-GDM: Offspring of women with diet-treated GDM (n = 168), 2) O-NoGDM: an unexposed reference group of offspring born to women with risk indicators for GDM but with a normal OGTT (oral glucose tolerance test) (n = 141) as well as 3) O-Type1 offspring of women with type 1 diabetes (n = 160) and 4) O-BP: an unexposed reference group of offspring from the background population (n = 128). At follow-up the participants underwent a bioelectrical impedance analysis to estimate total body fat mass percentage (%).

Results: In unadjusted analysis O-Type1 had the highest fat mass percentage (22.7% ± 8.1), followed by O-NoGDM (22.3% ± 7.8), O-GDM (22.2% ± 8.4) and O-BP (19.6% ± 7.3). When adjusted for relevant confounders including diet and other lifestyle factors, all three groups had significantly higher fat mass percentage compared to offspring from the background population (O-GDM; β = 3.0 (CI 1.6 - 4.5), O-NoGDM; β = 2.8 (CI 1.3 - 4.3), O-DM1; β = 2.6 (CI 1.3 - 4.0)).

Conclusion: An intrauterine hyperglycaemic environment may, in addition to genetic susceptibility and lifestyle factors, contribute to an increased risk of higher fat mass percentage in offspring.



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Pediatric NAFLD – Increasing obstacle of the new world. Retrospective analysis of COVID-19 Pandemic

The era of viruses in alliance with the current worldwide obesity epidemic has accentuated already established conditions, such as NAFLD. Adjusted practice guidelines of pediatric NAFLD to 'new world' and increasing number of children with metabolic disorders spur our interest to investigate incidence of fatty liver disease in our pediatric patients.

We aimed to estimate the prevalence of NAFLD defined by the fatty liver index (FLI) in overweight and obese children age 6-14 years,who visited our Institute during COVID-19 Pandemic. A retrospective study was conducted on 126 children aged 6–14 years who had a BMI≥85th percentile for age and gender based on the CDC 2000 growth charts. Data was obtained from medical records of children who underwent measurement of waist circumference, body mass index, and laboratory examinations of triglyceride and gamma glutamyl-transferase concentration during their ambulatory visit in National Institute of Endocrinology, Georgia during Covid-19 pandemic. BMI for age, waist circumference, triglyceride, and gamma glutamyl transferase concentrations in serum measured in each participant were plugged into the algorithm for the prediction of fatty liver. Exclusion criteria were concomitant liver disease, type 1 diabetes, and obesity due to iatrogenic causes.

Among the investigated children, majority of those with severe risk of NAFLD according to the FLI were obese. Interestingly, obese girls showed the higher prevalence of severe NAFLD than boys.

We concluded that assessing presence of NAFLD with FLI within overweight and obese children is cost-effective and could help clinicians to monitor treatment dynamic.

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Maternal glycemia during pregnancy in relation with glucose homeostasis during early childhood: Importance of prandial status and gestational stage

Background: Gestational diabetes mellitus (GDM) affects offspring glucose homeostasis, but less is known about the importance of maternal glycemia below the diagnostic threshold for GDM. Therefore, we examined the association between maternal glycemia during pregnancy and offspring glucose homeostasis from birth until 5y of age.

Methods: We measured maternal fasting glucose concentrations at gestational week (GW) 15, 28 and 36 and at GW28 an oral glucose tolerance test was collected in 208 pregnant women (pre-pregnancy BMI 28-45kg/m^2) without GDM (2h OGTT glucose ≥9mmol/L). Blood samples from the offspring were collected at birth, 3y and 5y of age to measure glucose and insulin concentrations. Linear mixed models were used to evaluate the association between maternal glycemia and offspring glucose and insulin, adjusted for multiple confounders.

Results: Available case analysis showed no association between maternal fasting glucose (mmol/L) at GW15 and GW36 and offspring glucose homeostasis at any time point. At GW28 maternal fasting glucose was negatively associated with offspring glucose (-0.45 (95% CI -0.88;-0.02), p=0.043) and positively associated with offspring log insulin (0.47 (95% CI 0.08;0.85), p=0.020) at birth, but not at 3y and 5y. Maternal 2h glucose at GW28 was not associated with offspring glucose and insulin at any time point.

Conclusion: Maternal fasting glycemia but not 2h glycemia at GW28 was associated with offspring glucoregulation at birth. These results indicate that glucose concentrations during a critical period of pregnancy around GW28 are associated with glucoregulation in newborns.

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PRE-Pregnancy weight loss And Reducing Childhood overweight (PREPARE CHILD) – a randomized controlled study at Aarhus University Hospital

Introduction: The prevalence of overweight in childbearing women has increased dramatically over the past decades. A child of an overweight mother has an increased risk of becoming obese themselves. This vicious cycle of obesity is an obvious target for intervention aiming to prevent obesity and obesity-related health complications for future generations.

Methods: PREPARE CHILD AUH is a randomized controlled study conducted at Steno Diabetes Center Aarhus at Aarhus University Hospital. We will recruit 140 healthy, overweight (BMI 27-45 kg/m^2), pregnant couples who are planning another child within 3 years. The couples are followed from their current pregnancy to the birth of the next child and randomized 1:1. The intervention group will receive dietitian counselling and attend physical activity sessions aiming a 10% weight loss between the two pregnancies.

The primary outcomes are neonatal fat mass assessed by Pea Pod and epigenetic changes of the cord blood in child 1 and child 2. Secondary parental endpoints include glucose metabolism, body composition by DEXA scans, VO2 max and energy expenditure. Secondary offspring endpoints include glucose metabolism, skinfold measurements and cardiac function measured by echocardiography.

Results: Inclusion was initiated on June 9th 2023 and 5 couples have been included. The study will run from June 2023 to May 2028. Accordingly, there are no results yet, but an overview of the study will be presented.

Conclusion/Perspectives: Hopefully, the PREPARE CHILD study will clarify the effects of a healthy lifestyle on paternal, maternal and fetal physiology in order to prevent childhood obesity.

Notes

Prevention of childhood obesity before and during pregnancy

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Effect of a high-protein and low-glycemic-index diet during pregnancy on offspring body composition and metabolic health during the first 5 years of life

Background: Maternal obesity and excessive weight gain during pregnancy are associated with higher birth weight and increased risk of childhood obesity. This study aimed to investigate the effect of a high-protein and low-glycemic-index (HPLGI) diet during pregnancy on offspring body composition and metabolic health.

Methods: We conducted a follow-up study of offspring born to women with a pre-pregnancy BMI of 28-45kg/m^2. In gestational week 15, women were randomly assigned to a HPLGI diet or a moderate-protein moderate-glycemic index (MPMGI) diet. Offspring BMI z-score and blood samples were obtained at birth, 3 and 5 years of age. Outcomes were analyzed using linear mixed models with group and time as fixed factors and participant-specific random effects.

Results: There were no significant differences in offspring BMI z-score. However, offspring born to women on the HPLGI diet exhibited higher levels of glucose (5.58±0.12 vs. 5.15±0.14mmol/L,P=0.017) and tended to have lower levels of insulin on the log-transformed scale (P=0.056) at birth, indicating 27% lower levels of insulin compared to the MPMGI diet. At 3 years of age, these offspring had lower levels of HDL (1.19±0.03 vs. 1.28±0.03mmol/L,P=0.018), and at 5 years of age, they had higher levels of total cholesterol (3.71±0.08 vs. 3.46±0.08mmol/L,P= 0.027) and LDL-cholesterol (2.30±0.06 vs. 2.03±0.07mmol/L,P=0.003) compared to the MPMGI diet.

Conclusion: An HPLGI diet during pregnancy did not affect offspring body composition during the first 5 years of life. However, it was accompanied by worse metabolic outcomes in the offspring, suggesting that further research is needed to understand long-term health effects.

Notes

Prevention of childhood obesity before and during pregnancy

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PRE-Pregnancy weight loss And Reducing Childhood overweight (PREPARE CHILD) –a randomized controlled study at Aarhus University Hospital

Introduction: The prevalence of overweight in childbearing women has increased dramatically over the past decades. A child of an overweight mother has an increased risk of becoming obese themselves. This vicious cycle of obesity is an obvious target for intervention aiming to prevent obesity and obesity-related health complications for future generations.

Methods: PREPARE CHILD AUH is a randomized controlled study conducted at Steno Diabetes Center Aarhus at Aarhus University Hospital. We will recruit 140 healthy, overweight (BMI 27-45 kg/m^2), pregnant couples who are planning another child within 3 years. The couples are followed from their current pregnancy to the birth of the next child and randomized 1:1. The intervention group will receive dietitian counselling and attend physical activity sessions aiming a 10% weight loss between the two pregnancies.

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Results: Inclusion was initiated on June 9th 2023 and 5 couples have been included. The study will run from June 2023 to May 2028. Accordingly, there are no results yet, but an overview of the study will be presented.

Conclusion/Perspectives: Hopefully, the PREPARE CHILD study will clarify the effects of a healthy lifestyle on paternal, maternal and fetal physiology in order to prevent childhood obesity.

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Fish-oil supplementation in pregnancy and anthropometrics and metabolic health at age 10 years; a randomized clinical trial

This is a follow-up analyze of a randomized clinical trial conducted among 736 pregnant women and their offspring, participating in the Copenhagen Prospective Studies on Asthma in Childhood mother-child cohort. Intervention was n-3 LCPUFA or control daily from pregnancy week 24 until one week after birth. We previously reported that children of mothers who received fish-oil had higher BMI at 6 years of age mirrored by a proportional increase in fat-, muscle and bone mass, but no difference in fat percentage. We here report follow-up at age 10 years, outcomes were anthropometric measurements, body composition, blood pressure, levels of triglycerides, cholesterol, and glucose from fasting blood samples, a combined metabolic syndrome score was calculated.

Children in the n-3 LCPUFA group had a higher BMI at age 10 compared to the control group: Mean(SD):16.9(2.28) vs.17.4(2.44);p=0.020 and a higher odds ratio of having overweight, OR=1.53;95% CI[1.01;2.33],p=0.047. This corresponded to differences in body composition in terms of increased bone mass: mean difference 20g[3-42];p=0.02), lean mass: 470g[100-860];p=0.01), and fat mass 500g[30-970]; p=0.04) and a trend of increased fat percentage compared to the control group. The children in the n3-LCPUFA group had a higher metabolic syndrome score: mean difference 0.51[0.08-0.94];p=0.02.

In conclusion children of mothers receiving n-3 LCPUFA during pregnancy had increased BMI at age 10 years, increased risk of having overweight, a tendency of increased fat percentage, and a higher metabolic syndrome score. These potential adverse health effects from n-3 LCPUFA should be followed through puberty and addressed in future studies.

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The prevention of adverse pregnancy and birth outcomes by periodontal treatment' (PROBE) intervention study - A controlled intervention study: Protocol paper

Periodontitis is a prevalent multifactorial inflammatory disease in the tooth-supporting tissues. Pregnancy may increase the risk of periodontitis due to hormonal changes. Moreover, periodontitis during pregnancy is associated with development of pregnancy- and birth related complications. The overarching aim of the PROBE study is to determine, whether periodontal treatment during pregnancy can reduce the systemic inflammation and influence complications during pregnancy and fetal growth. The PROBE study is a controlled intervention study conducted among 600 pregnant women with periodontitis.

Approximately 1200 pregnant women will be approached from two Danish hospitals in Region Zealand during their nuchal fold scan and subsequently screened for periodontitis, leading to the inclusion of 300 pregnant women who will be offered periodontal treatment during pregnancy and 300 pregnant women who will be offered treatment after giving birth. All 1200 women will have inflammatory and hormonal markers as well as markers of glycaemic control collected at the same time when they are screened, and women included in the intervention will have further measurements during gestational weeks 20 and 35. Approval was granted by the regional ethical committee and reported to the Danish Data Protection Agency.

The study will be conducted in accordance with the Helsinki Declaration and guidelines for Good Clinical Practice. PROBE is designed to provide evidence as to whether periodontal treatment during pregnancy can reduce the prevalence of preterm birth, low birth weight and risk of preeclampsia and gestational diabetes and to examine the inflammatory markers mediating this.

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Eating behavior in children with overweight and obesity attending a multicomponent lifestyle camp with 52-weeks follow-up: Validity and reliability of the Danish Child Eating Behavior Questionnaire (CEBQ)

Background: Weight status is associated with eating behavior in children. Objectives were to validate a Danish version of the Child Eating Behavior Questionnaire (CEBQ) in Danish children with overweight and obesity and investigate changes in eating behavior traits after a 10-week lifestyle intervention with 52 weeks follow-up. In addition, investigate associations between anthropometry and eating behavior traits.

Methods: Children 7-14 years of age with overweight and obesity were recruited from two 10-weeks lifestyle intervention camps. Children attended these camps if they had problems with overweight or obesity, loneliness, or having social/family related problems. The lifestyle intervention camps are multicomponent in accordance with national recommendations. The aim of the camps is to improve health and quality of life. At baseline, 10-weeks and 52-weeks body weight, body fat, skeletal muscle mass and height was measured. BMI-SDS was calculated and overweight defined as BMI-SDS >1SD and obesity >2SD. Parents answered the CEBQ with their child.

Results: The Danish version of CEBQ showed good psychometric properties to evaluate eating behavior. During the 10-weeks all eating behavior traits but Emotional Undereating improved significantly, with sustained changes at 52-weeks. Decreases in BMI-SDS after 10-weeks was associated with reduction in Food Responsiveness, increase in Satiety Responsiveness, and increase in Slowness in eating.

Conclusion: Children with overweight and obesity achieve favorable short- and long term changes in eating behavior after lifestyle intervention suggesting that attending multicomponent camps induce health benefits beyond weight loss.

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How can we assess the capacity of Danish health and child-care professionals to promote healthy weight development?

Background: Considering that children and adolescents spend around 1/3 of their time at daycare or schools, these settings – including the social norms, the food and physical activity environment as well as family engagement in school and daycare programmes – are important for healthy weight development. Likewise, healthcare professionals play an essential role. For example, health visitors and midwives reach families during pregnancy and early life, which are significant life periods in relation to weight development.

Aim: To target these settings, more knowledge about enablers and barriers to health promotion and prevention is needed. Therefore, the Centre for Childhood Health will assess the practices and capacity among Danish professionals in childcare, school, and healthcare settings.

Methods: The study (2023-2025) will conduct national surveys to measure health-promoting practices and capacity. The surveys will be developed based on (1) a literature review of studies and surveys within the scope, (2) qualitative interviews with the target groups, and (3) stakeholder involvement, including Delphi processes with research- and practice experts.

Discussion: One of the key methodological questions is how to operationalize health promotion "capacity" among the various target groups. For example, what is the most suitable theoretical concept to capture the capacity? Is capacity an individual property or a property within an organizational context? Is it a state or process? At the conference, we will present the study design and preliminary operationalization. We encourage delegates to share thoughts and inputs on assessing health promotion capacity.

Notes

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Negotiation of healthy food retail initiatives between researchers, retailers, and public health advocates in Denmark: An ethnographic study of the intervention development process in the Healthier Choices in Supermarkets study

Background: Commercial actors, such as supermarkets, hold a massive influence on the food environment and may therefore contribute positively to obesity prevention. However, current supermarket strategies are biased towards unhealthier choices. In 2019, the National Institute of Public Health, Denmark, partnered with the food retailer Salling Group and the Danish Cancer Society, to develop and test healthy food retail initiatives to make the healthy choice, the easy choice for customers. This study aims to increase our understanding of how such partnerships work and influence selection of intervention initiatives.

Method: We performed an ethnographic study from the initiation of the partnership until the feasibility test of the initiatives two years later. We used participant observation of meetings and project activities, interviews with partners, and document analysis of e-mail correspondences and project materials. We analysed data abductively with inspiration from a chronological narrative analytical approach and concepts of partnerships, negotiation, and institutional logics.

Findings: Our analysis shows how 1) a random meeting and initial verbal agreements between a few persons affect the mindset and decision-making of the partners, 2) conflicting logics can both hinder and facilitate the development of initiatives, and 3) the process is shaped by unforeseen events i.e., Covid-19 restrictions, and organisational changes.

Conclusion: Partnerships with supermarket retailers are unstable and fragile. Such partnerships may benefit from interventionists being flexible and investing time in forming a shared understanding based on discussions of different partner perspectives.

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Effects of a community-based high-intensity interval training intervention on body composition and quality of life in children with obesity: A randomized controlled trial

Introduction: Children with obesity are facing risks of metabolic and psychological complications. High-intensity interval training (HIIT) has shown several benefits on cardiovascular health and quality of life (QOL). Physical activity as part of a multidisciplinary lifestyle intervention is a keystone in the treatment, but children with obesity are often discouraged from participating in regular sport due to bad experiences. Therefore, a specialized training set-up is essential, and we aimed to study the effects of a HIIT intervention in children with obesity on body composition and QOL.

Methods: 173 children (101 boys, 12.2 ±1.7y) with obesity (BMI z-score = 2.49 ±0.6) were recruited from a family-based lifestyle intervention and randomized to a supplementary 12-weeks HIIT program or a control group. The HIIT program contained three weekly sessions and included 4 x 4 minutes of HIIT. Anthropometrics and QOL (PedsQL + WHO-5) were assessed at baseline and after 12 weeks of intervention.

Results: 91 children participated in the HIIT intervention, with a high attendance rate (77,8%) and a low dropout rate (10.3%). Comparison between the groups revealed a significant larger reduction in BMI z-scores in the HIIT group (mean diff. 0.06 (CI: -0.002, 0.12; $P < 0.05$). The HIIT group experienced a greater increase in QOL (mean diff. PedsQL child, total score of 3.10 (CI: 6.16, 0.04; $P < 0.05$)), and a similar trend was found for the PedsQL parents proxy-report ($P = 0.1$) and WHO-5 ($P = 0.3$).

Conclusion: Our results demonstrate that specialized community-based HIIT, in addition to a lifestyle intervention, is feasible and effective in reducing BMI z-score and improving QOL.

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Making health data accessible efficiently and timely

The Swedish Public Health Agency recently reported that ”childhood obesity is increasing and every fourth 6-9 year old has overweight or obesity”. Another report addressed ”the increased prevalence of overweight and obesity among four-year-old Swedish children during the first year of COVID-19” (Miregård et al, Acta Pediatrica, 2023). None of these reports came as a surprise, the problem is that using best available data means that the data is over two years old. They illustrate the problem of working wirh population health, where actions and interventions are developed to address the problem, but du we have the data to follow up and/or decide on what actions and interventions will have the best effect?

To address this problem th Swedish Ending Childhood Obesity (ECHO) initiative (https://Swelife.se/en/echo) is working with different aspects of how childhood obesity can be addressed. An importens part of the ECHO initiative is contributing to defining how secondary use of health data can be don. This work focusens on finding solutions that are meeting all the legal requirements of data handling, architecture and safety to ensure the integrity of the individual. Based on that work solutions enabling correct secondary usage of health data will be designen and developed. The solutions will, in a first stag, be designed to suit the needs for health work in the municipality setting.

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Developing the Bloom intervention: Co-creating an intervention promoting healthy weight development and well-being during infancy and childhood with community health nurses and parents

Background: Childhood obesity is a major public health challenge, and it is recommended to promote healthy weight development already during infancy. Co-creating an intervention with relevant stakeholders and target group is important to maximize feasibility and sustainability and the chances of successful implementation. This paper describes the co-creation process of the Danish Bloom Intervention – an early intervention to promote healthy weight development and well-being among infants and toddlers of first-time parents.

Method: The co-creation process comprised two stages: 1) Evidence review, interviews, and observations with community health nurses (CHNs) and parents, and stakeholder consultations; and 2) co-creation of the intervention content including six workshops and eight group meetings with CHNs and stakeholders and four group discussions with parents.

Results: During stage 1, the intervention setting was identified as the unique system of CHNs in Danish municipalities. Further, we identified the need for developing intervention content focusing on nutrition, physical activity, sleep, screen use, and sense of security to promote healthy child weight development. In stage 2, the main intervention components were co-created: An upskilling course for CHNs and guidelines on how to talk to parents about behavioural risk factors and a video library, eight home visits and six telephone consultations from CHNs to parents during pregnancy and until the child is 2½ years old.

Conclusion: Development of the Bloom Intervention provides an example on how to co-create an intervention balancing evidence, the practical work of the implementers and the needs of the families.

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Promoting healthy weight in youth attending vocational education – a feasibility study of a participatory dynamic systems approach: The PROVE IT study

Background: The prevalence of overweight and obesity among youth attending Care, Health and Pedagogy vocational education in Denmark is 49% showcasing the need for effective interventions to promote healthy weight. No successful singular solution to combat obesity exists. Interventions building on participatory system dynamics approaches have shown promising results when targeting children in a community setting. This approach remains to be adapted and tested in a vocational educational setting where youth alternates between school and workplace-based training.

Aim: To determine if a participatory systems approach to promote healthy weight development among youth attending vocational educations is feasible and appropriate for further largescale testing.

Methods: The PROVE IT feasibility study (2023-2025) employs a mixed methods design using qualitative data, quantitative pre-post intervention measures and observations across two municipalities and two vocational educations to assess feasibility and preliminary outcomes. The intervention consists of an evidence based dynamic systems approach involving stakeholders across vocational educations, workplaces (e.g., nursing homes), municipal administrations and the civic society to 1) determine (local) drivers for healthy weight progression and their interrelations 2) to develop and implement actions to change the system that drives healthy weight.

Results: The design of the PROVE-IT study will be presented and discussed at the conference.

Conclusion: The results from the study will inform whether to proceed into a future multi-site-controlled trial.

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Vulnerable children and adolescents increase the amount of physical activity on an average day at the Danish Christmas Seal Home

Purpose: To evaluate the physical activity patterns before and during a residential stay at the Danish Christmas Seal Home (DCSH) for 7-14-year-old children and adolescents.

Methods: To determine daily activity level, the participants wore accelerometers Axivity AX3 (Axivity, Newcastle UK) for one week before the residential stay (measurement period 1) and one week during their residential stay (approximately week 7th-8th: measurement period 2). The study had a crossover design at the DCSH level with a standard group (SG) and a standard plus group, SG+, including "11 for Health" activities. The 11 for Health activities unified football exercises, small-sided games, health education, and well-being-promoting activities.

Results: The participants with two valid measurement periods (N=56, SG and SG+ combined) increased their time spent with physical activity in the categories light activity by 9.3% (1297 sec, CI: 441; 2153, P=0.004), moderate activity with 57.6% (1414 sec, CI: 1098; 1730, P<0.001), and vigorous activity with 50.8% (552 sec, CI: 377; 727, P<0.001) and had a 4.5% borderline reduction in time spent sedentary (-1049 sec, CI: -2166; 68, P=0.065) on an average day during the measurement week at the DCSH compared to a week at home before their stay.

Conclusion: A residential stay at the DCSH has a significantly higher amount of physical activity compared to the baseline measurements of the 7-14-year-old participants – measured at home before the residential stay.

The project has received funding from "Novo Nordisk Fonden", "TrygFonden", "Helsefonden", and "Augustinusfonden".

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Feasibility and acceptability of school-based intervention components to promote healthy weight and wellbeing among school-aged children – a mixed methods process evaluation study among children, parents and school staff participating in the Generation Healthy Kids pilot intervention in Denmark

Background: The Generation Healthy Kids (GHK) intervention aims at promoting healthy weight and wellbeing in 6-9-year-old children. The two-school-year intervention includes multiple components addressing food and nutrition, physical activity, screen media habits, and sleep, and targets multiple settings (schools, families, and local communities). The present study investigates feasibility/fidelity and acceptability of the preliminary GHK school-based intervention components and explore barriers and facilitators for implementation.

Method: An eight-week feasibility study was conducted in January-March 2023 among 1st and 2nd graders at a Danish public school. Process evaluation data were collected using parent and teacher surveys; teacher logbooks; parent evaluation sheets; project group registrations; participant observations; and interviews with teachers and school leader.

Results: It was feasible to deliver the suggested intervention components within a school context, but only five of 11 intervention components were fully delivered as intended. The level of acceptability varied across components: some were found acceptable by (nearly) all children, parents and/or teachers (e.g., 3x40 min. physical activity sessions), while others were found acceptable by some (e.g., a free school meal scheme) or by few (e.g., a cold-water dispenser). Barriers and facilitators for implementation included school resources, school staff commitment, and school class dynamics.

Conclusion: The study underlines the importance of feasibility studies, and the findings will guide the refinement of intervention components and implementation strategies tested in the main trial in the fall 2023.

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Virtual supermarket for childhood obesity prevention: A study protocol

Background: Virtual reality (VR) has the potential to overcome limitations in changing behaviors relating to healthy eating and physical activities by providing opportunities to practice desired behaviors in the frequency and magnitude necessary for durable habit formation.

Methods: This prospective control randomized study will be carried out in adolescents aged 14 to 18 years old (N=30). Each session will last approximately one hour. Both groups received the same, 3-week behavioral program (2 sessions/week). Each session will last 60 min and will include a 10-min VR stressor test, a 10-min of rhythmic breathing relaxation session (intervention group) or not (control group), and 40 min of food exposure. The Virtual Supermarket is a three-dimensional software application that allows the shopper to navigate through a virtual store, pick a product, and put it in the virtual shopping cart. The participants will be asked to buy as many foods as they may need in a day (breakfast, lunch, dinner, and two mid-meals). Afterward, they receive individualized feedback, considering their individual energy expenditure and food groups. Assessments will be conducted at study entry and after 3 weeks.

Conclusions: The primary outcomes will be the reduction of anxiety and improved eating behavior after the experimental stress induction. VR has the potential to increase the practice of desired healthy eating behaviors.

Funding: Research relating to this abstract was funded by the RO-MD Cross-Border Program, Priority 4.1 - “”Support to the development of health services and access to health””, project code: 1HARD/4.1/93.

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Using Intervention Mapping to develop the Bloom intervention - a home-based intervention to promote healthy weight development and well-being among infants and toddlers

Background: It is essential to investigate the health problem, development process, and content of interventions to understand why interventions succeed or fail. This article describes the theory- and evidence-based development of the Bloom intervention - a home-based intervention to promote healthy weight development and well-being among infants and toddlers in Denmark.

Methods: Development of the intervention was guided by six steps from the Intervention Mapping protocol. Step 1: Needs assessment including identification of risk factors in infancy and existing interventions. Step 2: Development of program theory and matrices. Step 3: Selection of theoretical methods and practical applications for modifiable determinants. Step 4: Development of intervention tools. Step 5: Planning of program adoption, implementation, and sustainability. Step 6: Generation of an evaluation plan.

Results: The Bloom intervention is universal but with a strong focus on families with low socio-economic position and minority ethnic background. The target group is first-time parents, and it addresses early risk factors for child overweight such as parental skills and habits related to food and meals, movement, screen use, sleep, and family sense of security. It will be integrated in existing services delivered by community health nurses supplemented with telephone consultations, family groups and a video library.

Conclusions: The transparency of the developmental process and theoretical, empirical, and contextual foundation of the Bloom intervention may enable future studies to build on our findings and accumulate knowledge to promote healthy weight development and well-being among children.

Notes

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How can we assess the capacity of Danish healthcare, childcare, and educational professionals to promote healthy weight?

Background: Considering that children and adolescents spend around 1/3 of their time at daycare or schools, these settings – including the social norms, the food and physical activity environment as well as family engagement in school and daycare programmes – are important for healthy weight development. Likewise, healthcare professionals play an essential role. For example, health visitors and midwives reach families during pregnancy and early life, which are significant life periods in relation to weight development.

Aim: To target these settings, more knowledge about enablers and barriers to health promotion and prevention is needed. Therefore, the Centre for Childhood Health will assess the practices and capacity among Danish professionals in childcare, school, and healthcare settings.

Methods: The study (2023-2025) will conduct national surveys to measure health-promoting practices and capacity. The surveys will be developed based on (1) a literature review of studies and surveys within the scope, (2) qualitative interviews with the target groups, and (3) stakeholder involvement, including Delphi processes with research- and practice experts.

Discussion: One of the key methodological questions is how to operationalize health promotion "capacity" among the various target groups. For example, what is the most suitable theoretical concept to capture the capacity? Is capacity an individual property or a property within an organizational context? Is it a state or process? At the conference, we will present the study design and preliminary operationalization. We encourage delegates to share thoughts and inputs on assessing health promotion capacity.

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The Infant Health Project: Promoting mental health and healthy weight through sensitive parenting to developmentally and regulatory vulnerable infants – a mixed methods community-based study

Background and aim: Research evidence points to the impact of cognitive, emotional and behavioral dysregulation in the early childhood trajectories of mental health problems and unhealthy weight. Intervention to developmentally and regulatory vulnerable infants includes the promotion of sensitive parenting; and previous research suggests preventive potentials of the community health nurses (CHNs). This study evaluates a community-based intervention of sensitive parenting delivered by CHNs to reduce mental health problems and unhealthy weight among infants with cognitive, emotional, and behavioral problems aged 9-24 months.

Methods: In 16 Danish municipalities, the standardized PUF-program was used to identify infants with developmental vulnerabilities at ages 9-10 months. The VIPP-PUF intervention builds on The Video-feedback Intervention to promote Positive Parenting and the PUF-program. The VIPP-PUF is highly manualized and delivered during six home-visits of trained and supervised CHNs. The effectiveness is explored in a step-wedge cluster-randomized design with child mental health, parenting and weight development at ages 18 and 24 months as the outcomes. A mixed methods process evaluation includes quantitative and qualitative measures to explore implementation, parents' experiences, and ethnographic studies of municipalities' conditions for initiating and sustaining VIPP-PUF.

Preliminary results: Follow-up examinations will complete in 2025. Preliminary findings show high participation among recruited families across control- and intervention groups (>80%). The VIPP-PUF seems to be well appreciated among parents, and the commitment among participating CHNs is high.

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Children's COOPeration Denmark (Child-COOP): Promoting physical activity in children aged 6-12 years - a 3-year controlled system dynamics trial

Background: Lack of physical activity (PA) and unfavourable weight development in Danish children is a challenge; and is shaped by a complex interplay between a wide range of factors at individual, family, community and society levels. Interventions building on participatory system dynamics approaches (PSDA) have shown a feasible way to address such complex problems.

Aim: To present results from the Child-COOP feasibility study and the design of the Child-COOP trial, which aims to examine if a community-based PSDA can promote healthy PA behaviour and favourable weight development in children aged 6-12 years.

Methods: Child-COOP is designed as a 3-year controlled waiting list trial with five Danish municipalities each participating with an intervention community and a control community. The intervention consists of a evidence based system dynamics process including tight-scripted group model building workshops followed by action group formation and support. The effectiveness will be evaluated comparing the intervention and control communities. Individual outcomes include objective measures of PA and anthropometrics as well as questionnaire data. System outcomes include community readiness, local capacity and tracking actions. Further, a health-economic cost consequence analysis will be performed and a process evaluation will inform "what works for whom under what circumstances".

Results: The initial results from the Child-COOP feasibility study showed the potential for the Child-COOP trial, and additional results will be ready by autumn 2023.

Conclusion: The potential of Child-COOP is to evaluate whether to recommend this community-based approach for national scale up.

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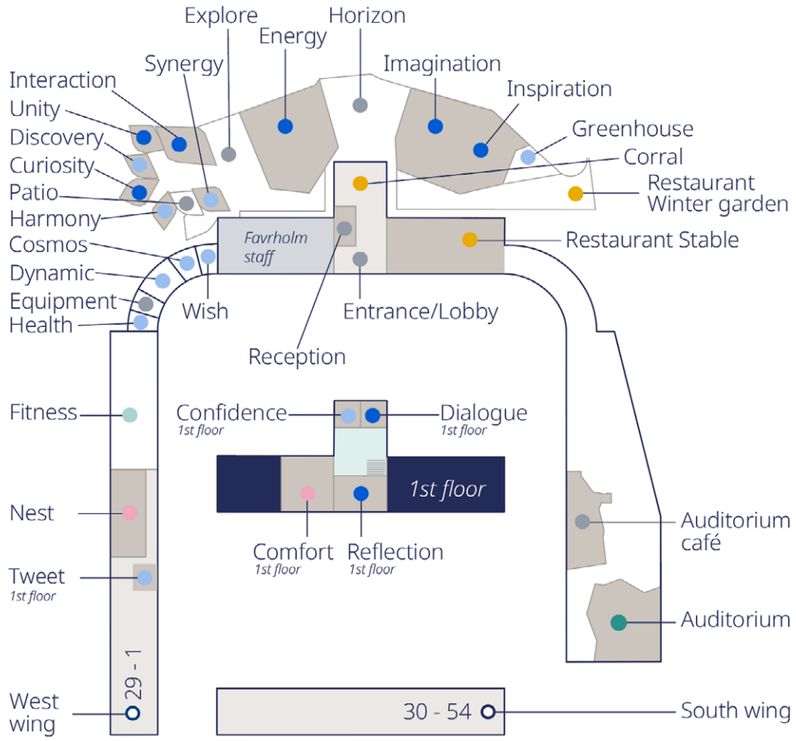

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