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Effect of body mass loss intervention in obese adolescents on the perivascular adipose tissue. Abstract of the 31st Annual Congress of ECOG (European Childhood Obesity Group), Vichy, France, November 2–4, 2022

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The 31st Annual Congress of ECOG

Vichy, France, November 2–4, 2022

Abstracts

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Disclosure Statement

The abstracts included in this supplement were reviewed and selected by all the members of the scientific committee. The committee has no conflicts of interest in connection with the congress and the selection of abstracts.

Effect of body mass loss intervention in obese adolescents on the perivascular adipose tissue

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Background/Aims: Early vascular dysfunction likely to track into adulthood is among the prominent and common consequences of adolescents obesity, The contribution of the perivascular adipose tissue to this dysfunction has not been extensively studied, and it is not known whether it mediates the metabolic or vascular improvements related to a lifestyle intervention. Our aims were to 1) compare the carotid extra-media thickness (cEMT) - whose perivascular adipose tissue is a major component - in obese and control adolescents 2) to characterize the evolution of cEMT and investigate its determinant in response to a 3-month lifestyle program based on diet, exercise training and vitamin D supplementation.

Methods: 15 normal-weight (NW) and 20 obese adolescents (OB) comparable in age, male-female distribution and Tanner stage were involved in a controlled trial (NCT02400151) leading to $-7.5\text{kg}\pm 3.3\text{kg}$ and $-10.9\pm 4.7\%$ in BMI z score in the OB group. Macro and microvascular function and structure indices obtained from high-resolution vascular ultrasonography and laser speckle contrast imaging, and biological parameters were assessed pre and post-intervention (obese)/control period. The body composition was assessed with dual-energy x-ray absorptiometry.

Results: The cEMT of NW and OB adolescents was not different (632.0 ± 115.3 vs. 640.6 ± 151.4 $p=0.856$) and did not significantly change with intervention (all $p>0.535$). In OB, the cEMT change was a strong mediator of the association between the changes in fat mass and leptin but was not directly associated with the improvement of any vascular variable.

Conclusion: These results suggest a reversible remodelling in nature of perivascular tissues in adolescent obesity.

Conflict of Interest: None.

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The influence of early childhood diet on the level of physical activity and body mass composition in children

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Background/Aims: The aim of the study was to check whether the length of the breastfeeding period and the time at which the child started eating solid food have an influence on their level of physical activity and body mass composition in preschool or school ages.

Methods: The initial study group consisted of 1002 children, aged 3-16. The subjects' height was assessed with the Seca 225 height meter, weight and body composition with the TANITA analyser. A 7-day analysis of body mass composition was performed with the Actigraph analyser. The parents also filled in a questionnaire on the child's early childhood, providing information on the birth weight and length, time of breastfeeding, and the time the diet was expanded. The collected data was analysed statistically.

Results: Girls are characterized by a higher content of adipose tissue ($p<0.001$) and longer sitting time ($p=0.022$), while boys have a higher content of water ($p=0.001$), muscle tissue ($p=0.001$), lean tissue ($p=0.001$) and higher daily number of steps ($p=0.022$). The highest content of adipose tissue was recorded in children aged 14-16 years (who at the same time had the longest sedentary time ($p<0.001$) and the highest water content in children aged 7-13 ($p<0.001$). Higher percentage TBW values were found among children who started eating solid food after 12 months of age than in children who started eating like adults <12 months of age ($p=0.016$). Starting to eat solid food before the age of 12 months predisposes to higher values of sedentary time ($p=0.019$). Children who had been breastfed >6 months of age have a higher content of lean tissue, muscle and water than those fed <6 months ($p<0.001$ in all cases). Importantly, these children took more steps per day than those who had been breastfed <6 months ($p=0.003$).

Conclusions: Diet in early childhood shows an influence on body mass composition and physical activity in later years. Shortening the time of breastfeeding and earlier introduction of solid food may result in abnormal body mass composition and lower levels of physical activity.

Better diastolic function in adolescents is associated with vigorous physical activity, independently of lesser intensities and adiposity

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Background/Aims: The relationship between physical activity (PA) and left ventricular diastolic function (LVDF) has not been well studied in adolescents. We assessed the associations of different PA intensities with LVDF, accounting for the well-known effect of adiposity.

Methods: Wrist-worn accelerometry was used in 12–17-year-olds with ($n=33$; body mass index [BMI] $z\text{-score}=0.1\pm 0.6\text{SD}$) and without ($n=36$; BMI $z\text{-score}=2.1\pm 0.6\text{SD}$) overweight/obesity. LVDF and adiposity were assessed by echocardiography and bio-electrical impedance analysis, respectively. Multivariable regression was used to compare the independent effects of PA intensities and adiposity with LVDF, controlling for age, sex and Tanner score.

Results: Vigorous PA (VPA), but not lesser intensities or adiposity, was associated with better LVDF. Tissue Doppler measures were better than other measures at detecting this association, with septal early-to-late diastolic peak velocity ratio being most strongly associated ($r=0.43$, $p=0.004$). The inverse association of adiposity with LVDF did not persist when the PA measures were included in the model.

Conclusion: VPA is the only intensity that is associated with better LVDF in adolescents, independent of lesser intensities and adiposity. This supports our recent findings that only VPA was associated with cardiorespiratory fitness in adolescents and our recent meta-analysis showing septal tissue Doppler to be more sensitive than other LVDF measures in detecting the impact of cardiometabolic risk on adolescent health. The finding that adiposity no longer associates with LVDF when VPA is accounted for deserves further investigation, as it suggests vigorous exercise may protect against the adverse cardiac effects of obesity in the young.

Conflict of Interest: None disclosed.

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Deep subcutaneous adipose tissue is associated with pancreatic fat and hepatic fat in adolescents

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Background/Aims: Abdominal subcutaneous adipose tissue (SAT) is divided into superficial (sSAT) and deep (dSAT) depots. dSAT is associated with obesity-associated risks similar to those posed by visceral adipose tissue, while sSAT appears benign. Increased hepatic and pancreatic fat are associated with increased risk of obesity-related comorbidities. We investigated the relationships between SAT, hepatic fat, and pancreatic fat in adolescents.

Methods: 203 subjects were included (males $n=107$, obesity $n=182$, age 14.1 ± 2.1 years). Each participant underwent an oral glucose tolerance test (OGTT) and magnetic resonance imaging (MRI). Volumes of dSAT, sSAT, and fat fractions of liver and pancreas were assessed manually. dSAT and sSAT were both normalized against total SAT for all calculations. Standardized major axis regressions were calculated through males and females to assess relationships.

Results: There was a positive relationship between total SAT volume and liver fat in both males ($R^2=0.36$, $P=1.4\times 10^{-11}$) and females ($R^2=0.30$, $P=1.48\times 10^{-8}$). The correlation between dSAT and liver fat was also positive in both sexes (males $R^2=0.21$, $P=9.04\times 10^{-7}$; females $R^2=0.13$, $P=0.0004$), while the relationship between sSAT and liver fat was negative (males $R^2=0.17$, $P=1.42\times 10^{-5}$; females $R^2=0.11$, $P=0.001$). Pancreatic fat followed a similar pattern. Liver fat was positively correlated with insulin at fasting and 120 min in both sexes, and with 120 min glucose in males.

Conclusions: SAT is associated with increased fat in both liver and pancreas in adolescents, and the relationship appears to be driven by the dSAT. The association is more pronounced in males than in females. Accumulation of dSAT seems to be related to metabolic risk, particularly in males.

Conflict of Interest: the authors declare no Conflict of Interest.

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Physical Activity Behaviours in Preschool Children living in a high-risk-of-poverty and social exclusion area

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Background/Aims: Unhealthy behaviours, such as low physical activity (PA), are acquired during childhood, can span into adulthood and contribute to later onset weight problems. This is concerning in Malta, which reports high childhood obesity prevalence (Grech et al, 2017).

Methods: Parents of Maltese preschool children (3-4 years) living in a high-risk-of-poverty area, were invited to participate following ethical approval. Children's anthropometric measurements were taken, and later, parent telephone interviews, using an adapted form of the Schools' Physical Activity and Nutrition Survey, were carried out during February 2018.

Results: 71 parents consented to take part, of which 54.8% (n=39) were interviewed. 8.1% (n=5) of the children accrued 60 minutes of moderate to vigorous physical activity (MVPA) daily. Significant differences were noted between the amount of days the children accumulated this daily MVPA and weight status, with children in the normal weight category presenting with a higher number of physically active days (WHO p=0.040, CDC p=0.018). Boys were reported to engage more in MVPA than girls (mean 4.17 days SD: 2.17; mean 3.78 days SD: 1.72 respectively) although not statistically significant (p=0.449).

Conclusion: The low levels of reported MVPA are concerning, also considering the setting. Strategies to improve children's PA behaviours, including educating parents on PA benefits and providing support, such as fiscal incentives, all merit further research and public health attention.

Conflict of Interest: None.

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Reference

Grech, V. et al. (2017) 'The Malta Childhood National Body Mass Index Study: A Population Study', *Journal of Pediatric Gastroenterology and Nutrition*, 65(3), pp. 327–331. doi: 10.1097/MPG.0000000000001430.

The impact of health literacy on adolescents' health-conscious health behavior and on the management of obesity

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Background/Aims: Childhood obesity continues to rise, according to World Health Organization 2022 report. The main goal of the present review to investigate whether sufficient evidence suggesting that the levels of health literacy, or improvements in health literacy, influence obesity prevention, treatment and health behaviour among adolescents exist.

Methods: Scientific databases were searched to identify potentially relevant publications. We searched for original papers, conference abstracts in English, from 2017 to 2022. The main search terms were "health literacy", "health behavior", "adolescents" and "obesity". Inclusion criteria included literature on obesity prevention and obesity management among adolescents in the context of health literacy and health behaviors. Exclusion criteria: 1/ studies in which health literacy was examined amongst individuals younger than 10 or older than 18 years of age, 2/ studies investigating patients with other chronic conditions, and 3/ studies with low sample size (<100).

Results: Great number of studies have investigated different partial aspects of health literacy, but rarely studied it in its complexity. There is a modest number of literature investigating the relationship between health literacy and health behavior to see whether health literacy actually improves health-conscious behavior and thus has an impact on the prevention and treatment of obesity among adolescents.

Conclusion: Health literacy is an important factor in the management of all chronic diseases, including obesity, but further evidence is needed whether improvement in health literacy has an important positive impact on health behavior and the success rate of obesity prevention or treatment among adolescents.

Conflict of Interest: None disclosed.

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Appreciation of parenting support as part of a family-based home-centered pediatric obesity education program: results from the PROXOB study

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Background/Aims: PROXOB is a family-based, home-centered education program designed for the prevention and treatment of childhood obesity, and initiated by the Specialized Obesity Center (CSO-CALORIS) of Clermont-Ferrand. Based on the principles of patient education program, the program aims to implement personalized, progressive and sustainable Therapeutic Lifestyle Modifications (TLM) for the whole family, with the objective of improving the quality of life of each family member and stabilizing body weight. PROXOB develops a home-based intervention gathering physical activity education, nutritional education, and psychological and parenting support to families concerned with pediatric obesity. To analyze the effect of the PROXOB intervention, especially its parenting support and the parental feeling of parental competences using the QAECEP score (Parenting Skills Self-Assessment Questionnaire) evaluating parental efficacy, satisfaction and competence scores. Then, parenting scores were correlated with various family profiles.

Methods: The study population included families who participated in PROXOB intervention from 2017 to 2018. The QAECEP questionnaire was filled by each parents to evaluate effectiveness, satisfaction, and parenting scores before, 6 and 12 months after the intervention.

Results: 27 families participated in full home support (25 mothers, 18 fathers and 53 children including 19 girls and 34 boys). The mean initial z-score of the children was 2.8 ± 1.8 [1.5; 3.9]. Overall, the scores of parental efficacy was acceptable and vary little following the PROXOB support (from 31.1 ± 5.4 to 30.2 ± 5.8 between M0-M12, $p=NS$). However, the feeling of parental satisfaction significantly increased between M0 and M12 according to parental age: 40.2 ± 8.5 to 45.0 ± 5.3 for parents $>40y$ ($p<0.03$), whereas it did not change for parents younger than 40y old (40.5 ± 8.4 à M0 à 38.9 ± 10.0 , $p=NS$). It was also different between monoparental and biparental families ($p<0.02$) and when at least one parent had overweight compared to non-overweight parents ($p<0.01$). The sense of parental competence was also affected by different criteria such as single parenthood, weight status of children and parents. The variation of the 3 scores was significantly correlated to the changes in quality of life scores, precariousness, BMI, Z-score and sleep time (all $p<0.05$).

Conclusion: The PROXOB education program has its originality from other childhood obesity management programs through the parenting dimension at home. Regarding the parenthood side, the QAECEP questionnaire is able to detect changes in different dimensions of parenting according to family profiles or weight status although it seem to be less sensitive as a global approach.

The impact of sugar-sweetened beverage and ultra-processed foods intake on leptin/adiponectin ratio in adolescents with obesity

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Background/Aims: An important category of ultra-processed foods is sugar-sweetened beverages (SSBs) that may be a key contributor to the epidemic of adolescent obesity, by virtue of these beverages' high added sugar content, low satiety, and the no satisfactory nutrients incorporate for total energy. The aimed of the study was to evaluate impact of sugar-sweetened beverage and ultra-processed foods intake on leptin/adiponectin ratio and anthropometric variables in adolescents with obesity.

Methods: 70 post-puberty adolescents with obesity aged 15-19 years and both genders. Blood samples to analyse leptin and adiponectin, anthropometric and body composition were collected, and the 24-hour recall was applied to assess food intake. The leptin/adiponectin ratio was calculated. Food categorization was performed according to the NOVA classification in unprocessed or minimally processed food; processed culinary ingredients; processed food, and ultra-processed food. The adolescents were grouped according to consumption of SSBs: Non-Consumers ($n=29$); and Consumers ($n=41$).

Results: The group that consume SSBs present hight free fat mass, body weight, rest metabolic rate and lpetin/adiponectin pro-inflammatory ratio as well as higher food intake in grams, energy, proteins, lipids, cholesterol, carbohydrates, fiber and saturated and polyunsaturated fats from ultra-processed foods. Add to this, an important complementary analysis revealed that ultra-processed consumption is associated with increased weight and waist and neck circumferences, important pro-inflammatory predictors.

Conclusion: Our results point to a possible relationship between the consumption of SSBs resulting from the consumption of ultra-processed food and the increase in pro-inflammatory biomarkers reflected in the leptin/adiponectin ratio in adolescents with obesity.

Conflict of Interest: None Disclosed.

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Obesity and physical fitness of students in the Northern Region of Portugal: socioeconomic conditions

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Background/Aims: High prevalence of overweight and obesity is a public health problem, with several negative repercussions. The main propose of the present study was (i) to analyze the association of body mass index (BMI) with the levels of physical fitness (FIT) of students in the North of Portugal; and (ii) to analyze the association between different school environments, based on the proportion of students that were economically disadvantaged (PSED), with BMI and FIT levels.

Methods: 214 schools in the North of Portugal (N=411, total), and 39412 students (N=183108 total), were eligible for the study. To assess FIT levels, the FITescola® test battery was used. To assess the school environment, the PSED was calculated (ratio of students with free or reduced-price school meals) for each school. To analyze the relationship between individual and FIT variables, BMI, and other context variables such as School (PSED) and City (purchasing power per capita), a multilevel regression was carried out at three levels.

Results: 31.9% of students had overweight or obese BMI. Most students had healthy FIT, boys showed greater FIT than girls in cardiorespiratory, muscle strength, speed and agility tests, while girls outperformed boys in flexibility. The multilevel model demonstrated a significant effect of BMI and PSED on FIT, while the City effect is limited to cardiorespiratory capacity.

Conclusions: There is a high prevalence of overweight and obese students in the North of Portugal. On the other hand, the increase in BMI, and schools with higher PSED, are associated with students with lower FIT.

Conflict of Interest: None Disclosed.

Funding: No Funding.

Characterization of feeding behaviour in children developing obesity before the age of 6 years

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Background/Aims: Obesity before 6 y of age is associated with unusual hyperphagia. Impulsivity may be observed. No study has assessed the feeding behavior (FB) of children with early onset obesity of different origin (hypothalamic or common obesity). We explored FB using self-questionnaires to identify specificities according to the etiology.

Methods: Dykens and impulsivity questionnaires were analyzed in 75 children (39 F; age 10.8±4.4 y; BMI Z-score 4.9±1.5 SD; age of obesity onset 3.8±2.7 y) across 3 groups (hypothalamic obesity (HO) (monogenic, syndromic, or lesional), intellectual disability (ID) with obesity, common obesity (CO)).

Results: The phenotype was not significantly different between the 3 groups except for the age of obesity onset (BMI > IOTF 40 at the age of 3.4±1.6 y for children with HO vs 4.6±1, 6 y for children with ID and 8.4±4.1 y for children with CO (p<0.01)) and the rebound adiposity (absent in 87% of cases in HO vs 63% in ID and 33% in CO (p<0.01)). The mean total Dykens score was 22.1 ± 7.2. 67% of children had Dykens > 19 and 15% impulsivity. Children with impulsivity had a significantly higher Dykens score than children without impulsivity (p<0.05).

Conclusion: During early onset obesity, FB is characterized by severe hyperphagia similar to that described in rare syndromes, sometimes associated with food impulsivity. It confirms the intensity of hyperphagia and the difficulty or impossibility of controlling it. Characterization of FB by targeted questionnaires is important to help in the care and to accurately assess the effect of new therapies targeting hyperphagia.

Clinical Improvements Following Setmelanotide Treatment in Patients With Bardet-Biedl Syndrome

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Background/Aims: In patients with Bardet-Biedl syndrome (BBS), signaling defects in the melanocortin-4 receptor (MC4R) pathway lead to hyperphagia and severe obesity, which negatively impact quality of life (QOL). In a Phase 3 trial, we investigated the impact of the MC4R agonist setmelanotide on weight, hunger, and QOL to more completely understand clinical benefit.

Methods: Patients ≥ 6 years old with BBS and obesity were enrolled in a Phase 3 trial (NCT03746522) to receive 52 weeks of setmelanotide. Hunger was assessed with an 11-point Likert scale in patients ≥ 12 years old without cognitive impairment. The Impact of Weight on QOL-Lite (IWQOL-Lite) and Pediatric QOL Inventory (PedsQL) were used to assess QOL in adults and pediatric patients, respectively. Clinical improvements were defined as $\geq 5\%$ body weight reduction for adults; ≥ 0.2 -point decrease in body mass index (BMI) Z score or ≥ 5 percentage-point decrease in percent of the 95th BMI percentile for pediatric patients; $\geq 25\%$ decrease in hunger score; 7.7- to 12.0-point increase in IWQOL-Lite score; and >4.4 -point increase in PedsQL score.

Results: Of 32 patients, 27 had clinical improvements in ≥ 1 measure, and 3 of 5 patients without improvement showed weight

stabilization; thus, 30 of 32 patients (94%) experienced clinical improvement or weight stabilization. Setmelanotide was generally well tolerated; 1 patient discontinued placebo because of an adverse event.

Conclusion: Most patients with BBS showed clinical benefit after setmelanotide treatment, measured by improvements in weight-related parameters, hunger, and QOL. Clinical improvements from antiobesity medications should be assessed beyond weight loss, including in patients with BBS.

Conflicts of Interest: AMH receives grant funding from the Western Family Microbiome Initiative and CIHR; is a speaker for Pfizer Canada; and is on the setmelanotide for Bardet-Biedl syndrome advisory board for Rhythm Pharmaceuticals, Inc., somatropin advisory board for Pfizer, and scientific advisory board for PWS-USA.

WC receives study funding and compensation for speaking engagements from Rhythm Pharmaceuticals, Inc.

HD receives consulting fees from Rhythm Pharmaceuticals, Inc.

AI receives compensation for medical writing from Rhythm Pharmaceuticals, Inc.

GAM-M receives compensation for lectures from Rhythm Pharmaceuticals, Inc. and participates on an advisory board for setmelanotide in patients with Bardet-Biedl syndrome for Rhythm Pharmaceuticals, Inc.

CP declares no Conflict of Interest.

JAY receives grant funding from Rhythm Pharmaceuticals, Inc. and Soleno Therapeutics, Inc. for clinical trials of setmelanotide in patients with obesity and Prader-Willi syndrome, respectively, and their institution receives colchicine and placebo from Hikma Pharmaceuticals for clinical trials.

SM is an employee of Rhythm Pharmaceuticals, Inc. and has company-awarded RSU and options.

PM is an employee of Rhythm Pharmaceuticals, Inc. and has company-awarded RSU and options.

GY is an employee of Rhythm Pharmaceuticals, Inc. and has company-awarded RSU and options.

EF is a clinical investigator for clinical trials of setmelanotide in Bardet-Biedl syndrome, participates on an advisory board, and receives consulting fees from Rhythm Pharmaceuticals, Inc.

KC is a clinical investigator for clinical trials of setmelanotide in Bardet-Biedl syndrome for Rhythm Pharmaceuticals, Inc., and receives grant funding from Ysopia, Integrative Phenomics, and Confo-therapeutics.

JA receives compensation for lectures from Rhythm Pharmaceuticals, Inc. and is on an advisory board for setmelanotide in patients with Bardet-Biedl syndrome for Rhythm Pharmaceuticals, Inc.

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New tool created to help dietician during 6-12 children overweight consultation

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Obesity commission of CEDE (Club Européen des Diététiciens de l'Enfance)

Background/Aims: Children overweight is a worldwide epidemic. The follow up of these patients needs to be implicated to the child but also there family. In order to help dieticians, the Obesity commission of CEDE decided to create a new tool, which aims to facilitate the communication during the consultation process.

Methods: This tool has been created based on literature regarding topics such as parenting, motivational interviewing and patient education, as well as on the basis of our field experience.

Results: We created a 16 sheet tool. Each sheet concerns a specific topic (such as hydration, sleep, physical activity, breakfast, out of home meals. etc.) and contains one part dedicated to the child (with a fun exercise) and another part dedicated to the parents. An annex is proposed to the dieticians with advice and suggestions to provide them with resources and recommendations. It has been validated by CEDE scientific committee and tested by many families. This complete tool download is possible on CEDE website. Each sheet can be printed by the dieticians depending on their needs.

Conclusions: With this tool, the dietician's keep the lead and management of their consultation but can use these sheets as a written tool to communicate with families and to measure the progress in the healthcare process.

Conflict of Interest: None.

Funding: No Funding.

Physical activity and sedentary behavior among different BMI groups of Lithuanian first-formers

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Background/Aims: Data of first-formers presented (n=3254) was collected while participating in the fifth round of WHO European Childhood Obesity Surveillance Initiative in 2019.

Methods: Anthropometric measurements were performed in 95 schools, and the estimated BMI was assessed according to the IOTF (2000) cut-offs. Family questionnaire was used for evaluation of physical activity and sedentary behavior. Chi-square test was used to analyze dependence between two nominal variables, Kruskal-Wallis test was used to compare quantitative not normally distributed data in independent groups.

Results: Most of children (91.3% on workdays and 98.8% on weekends) were physically active more than 1 hour during their leisure time. The average time spent by first-formers in sport or dance clubs was 3.35 hours per week (SD=1.9, Me=3). Half (51.6%) of the first-formers did sports for 2-3 hours per week, one third (22.3%) – 4 and more hours per week (p=0.010). There were no gender differences in clubs' attendance. A significantly higher proportion of children attending sport or dance clubs had a normal body weight compared to those not attending clubs (72.5% and 66.0%, respectively). A significantly higher proportion of elevated weight children spend 3 or more hours sitting in front of screens on workdays compared to normal weight first-formers (46.0% and 36.7%, respectively) (table 1). The same trend was observed on weekends (77.1% and 69.9%, respectively).

Table 1. Relation between BMI groups and time spent at screen

	Weight according to BMI groups			Total
	Thinness n (%)	Normal weight n (%)	Overweight/ Obesity n (%)	
Time spent watching TV or playing electronic devices on workdays				
Does not watch / play	26 (7.5)	168 (7.5)	30 (5)	224 (7)
Up to 1 hour	43 (12.4)	243 (10.8)	38 (6.3)	324 (10.1)
Up to 2 hour	168 (48.4)	1010 (45)	259 (42.7)	1437 (44.9)
Up to 3 hours and more	110 (31.7)	823 (36.7)	279 (46)	1212 (37.9)
Total:	347 (10.8)	2244 (70.2)	606 (19)	3197 (100)
Time spent watching TV or playing electronic devices on weekends				
Does not watch / play	8 (2.4)	81 (3.7)	22 (3.7)	111 (3.5)
Up to 1 hour	10 (2.9)	80 (3.6)	11 (1.8)	101 (3.2)
Up to 2 hour	101 (29.7)	504 (22.8)	103 (17.3)	708 (22.5)
Up to 3 hours and more	221 (65)	1547 (69.9)	459 (77.1)	2227 (70.8)
Total:	340 (11)	2212 (70)	595 (19)	3147 (100)

p<0.001 both on workdays and weekends

Conclusion: Most of Lithuania's first-formers were sufficiently physically active. Significant relations were found between children's BMI groups, their time spent in sport or dance clubs, and the time spent at screens.

Conflict of Interest: None.

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Promotion of a healthy lifestyle in school-aged children in Bulgaria: School for health – for children, parents and teachers

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Background/Aims: According to a recent WHO report (COSI study) 8.6% of children (6-9 years old) suffer from obesity, and 15.6% suffer from overweight in Bulgaria. There is a slight decrease in obesity incidence in girls compared to boys. However, there is no state programme for prevention of childhood obesity. BASORD has been organising annually a 7-day campus "School for health – for children, parents and teachers" in early September in Albena at the Black sea coast since 2012.

The aim of the School for health is to teach both children and adults (parents and teachers) to follow a healthy lifestyle through a healthy nutrition, to make healthier food choices, to increase the physical activity, to have enough sleep and to follow screen-time guidelines according to age.

Material & Method: A total of 50 participants (school-aged children 6-12 years old, parents and teachers) took part in the campus. Every morning at 7:30 all of the participants were doing sport at the beach. The gymnastic morning routine continued about 30 minutes. After the sport, everybody had breakfast and then the lectures for parents began. Every day there were different topics related to healthy lifestyle comprising: diet, physical activity, sleep, oral health etc. which were held by prominent experts in the field of childhood nutrition and obesity. During the lectures the children were having culinary classes on learning how to prepare salads, sandwiches and different healthy drinks-such as the traditional Bulgarian Airian, prepared with yogurt and water. Children were taught to distinguish between “good” and “bad” foods and how to make healthy choices. There were different games, swimming, running and etc. for children and parents. The diet was based on the principals of the Balkan diet and according to the age group national recommendations.

Results: The studied cohort showed an increased awareness concerning the healthy lifestyle, incl. the implementation of good nutritional habits and physical activity at a daily basis.

Conclusions: School for health – for children, parents and teachers is a programme that promotes healthy behaviour towards nutrition, physical activity, sleep and health for school-aged children and their parents.

Conflict of Interest: None.

Increased prevalence of overweight and obesity among four-year-olds in Sweden during the start of the COVID-19 pandemic: National data from Child Health Services

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Background/Aims: The Swedish Child Health Services target almost all 0–6-year-old children. Weight and height is measured by trained pediatric nurses repeatedly during this entire period. Still, national prevalence reports and follow up over time are scarce. This study summarized national data on prevalence of overweight and obesity among four-year-olds in Sweden in 2020 and compared these with corresponding data from 2018.

Methods: The data from Child Health Service records was available from 18 of 21 Swedish regions. Two proportions tests were used for comparison between sexes and between data from 2018 and 2020. The increase in the incidence of overweight and obesity between the sexes from 2018 to 2020 was also examined through interaction tests.

Results: Data from 105 445 four-year-olds born 2014 and 100 001 born 2016 were collected. In 2020, 13.3 % (n = 13,291) of the four-year-olds had developed overweight or obesity. More girls (15.1 %) than boys (11.6 %) were affected (p<0.001). When compared with data from 2018, a statistically significant increase corresponding to 16.6 % was seen in the prevalence of overweight and obesity at national level. The increase between the years was greater for obesity (31.8 %) than for overweight (13.3%). The increase was significant among both girls and boys.

Conclusion: The prevalence of overweight and obesity among four-year-olds in Sweden has increased. Corresponding trends due the COVID-19 pandemic are reported internationally. This requires attention. As part of prevention and for evaluation of health interventions, the prevalence needs to be followed.

Conflict of Interest: None Disclosed.

Funding: No Funding.

Predictive factors for Metabolic-Associated Fatty Liver Disease (MAFLD) diagnosis in children with obesity

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Background/Aims: The aim of the study was to compare if there are any differences in body composition variables derived from anthropometry (BMI Z-score, WHtR), bioelectrical impedance analysis (BIA), and dual x-ray energy absorptiometry (DXA), metabolic parameters (glucose, insulin, HOMA IR, lipid profile and ALT) between obese children with metabolic-associated fatty liver disease (MAFLD) vs. no-MAFLD obese subgroup.

Methods: Study group consisted 72 obese children (41 boys) in the mean age 12.61 +/- 3.13 years. MAFLD was diagnosed based on presence of hepatic steatosis in USG. MAFLD was diagnosed in 28 children (Body composition was assessed by simple anthropometry (BMI Z-score, WHtR), BIA (Tanita BC480MA), and DXA (Hologic). Obesity was categorized by IOTF criteria. ALT, AST, GTP, glucose and insulin metabolism (OGTT, HOMA IR) and lipid profile parameters were analysed in the entire group.

Results: MAFLD was diagnosed in 28 children (38.9%, 18 boys). BMI Z-score and WHtR were higher in MAFLD group however the differences did not achieve statistical significance. Non of the body composition parameters from BIA differed significantly between MAFLD vs. non-MAFLD subgroup. From body composition variables assessed by DXA only trunk/legs ratio of fat tissue distribution was significantly higher in MAFLD group (p<0.05). ALT level was significantly higher in MAFLD group as expected (p<0.001) and correlated significantly with fat tissue assessed by trunk/legs ratio in DXA (r = 0.419; p<0.001). Moreover, ALT level has significant relationship to the obesity severity assessed according to the IOTF criteria (ANOVA p<0.05). Fasting insulin and

HOMA IR were significantly higher in MAFLD group (both $p < 0.05$). There were no significant differences in other metabolic parameters between MAFLD vs. non-MAFLD subgroups.

Conclusion: The only positive biochemical predictors for the MAFLD diagnosis in obese children are fasting insulin and HOMA IR levels. From anthropometrical and body composition parameters MAFLD diagnosis was significantly related only to the fat tissue distribution assessed by trunk/leg ratio in DXA.

Conflict of Interest: None Disclosed.

Funding: No Funding.

Latent Profile Analysis of Children's Eating Behaviour: Identifying Avid Eaters

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Background/Aims: Previous research has evidenced that from infancy onwards genetic influence on weight is partly mediated by appetite avidity, expressed as food approach (FA) behaviours. Children who are more food responsive eat more frequently throughout the day than children who are less responsive to food cues, increasing susceptibility to future obesity. However, no research has yet identified a distinct eating behaviour profile reflecting appetite avidity in children or examined how other factors such as child temperament, experience of food insecurity, or parental feeding practices, may vary by that profile.

Methods: 995 parents/carers living in England and Wales completed an online. Participants reported on their child's eating behaviour using the Child Eating Behaviour Questionnaire (CEBQ), as well as completing measures of child's temperament (VSF-CBQ), household food security (HFSS), and parental feeding practices (CFPQ). Latent Profile Analysis (LPA) was carried out to identify distinct eating profiles amongst the children (36-72 months, $Mage = 48.8$ months, 52% female).

Results: Three profiles emerged: (a) avid eaters, (b) typical eaters, (c) fussy eaters. Avid eaters (32.6% of children) were characterised by higher food responsiveness, enjoyment of food, and emotional over-eating in combination with lower satiety responsiveness, slowness in eating, emotional under-eating, and food fussiness.

Conclusion: Avid eaters are reported to be more surgent, with less display of negative emotion, and are the recipients of a range of adaptive feeding practices, including monitoring, but are subject to greater parental control over their eating. There was no significant difference in food insecurity between the three eating profiles.

Conflicts of interest: None.

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Interim Efficacy and Safety Analysis of Setmelanotide As a Novel Treatment for Hypothalamic Obesity

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Background/Aims: Hypothalamic injury and impaired melanocortin-4 receptor (MC4R) pathway signaling, often resulting from surgery or radiation for a benign tumor, may lead to hypothalamic obesity (HO). After injury, weight gain and appetite changes unresponsive to existing therapies develop. Setmelanotide is approved for chronic weight management in patients with MC4R pathway-associated diseases. We report interim results of a Phase 2 study of setmelanotide in HO (NCT04725240).

Methods: Patients aged 6-40 years with body mass index (BMI) ≥ 95 th percentile (children 6 to < 18 years) or ≥ 35 kg/m² (adults ≥ 18 years) and HO caused by structural hypothalamic damage secondary to a benign brain tumor, surgical resection, and/or chemotherapy were enrolled. The setmelanotide dose was titrated over 2-4 weeks to 3.0 mg once daily, followed by 12-14 weeks at target dose. The primary endpoint was the proportion of patients achieving $\geq 5\%$ BMI reduction at Week 16. Hunger was rated daily using a numerical rating scale (0 [not hungry] to 10 [hungriest possible]).

Results: Eleven patients were included (baseline mean [SD; range] age, 14.6 [4.8; 6-23] years and mean [SD] BMI, 38.7 [5.7] kg/m²). All patients (90% CI, 76.2%-100%) had $\geq 5\%$ BMI reduction ($P < 0.0001$); 81.8% (90% CI, 53.0%-96.7%) had $\geq 10\%$ reduction ($P < 0.0001$). Mean (range) BMI change was -17.2% (-37.2% , -6.7%). Mean (SD) change in hunger score was -2.7 (2.6). Frequent adverse events included nausea (63.6%), vomiting (45.5%), diarrhea (36.4%), and COVID-19 (36.4%). Two patients discontinued because of adverse events.

Conclusions: These results warrant continued evaluation of setmelanotide in this population with no approved therapies.

Conflict of Interest: CLR's institution has received research support from Rhythm Pharmaceuticals, Inc.

AHS has received payments from Rhythm Pharmaceuticals, Inc. and Saniona for participating in advisory boards and lectures. AHS's institution has received research support from Rhythm Pharmaceuticals, Inc.

MG has received payments from Rhythm Pharmaceuticals, Inc. for Data Safety Monitoring Board and advisory boards.

JLM received study funding from Rhythm Pharmaceuticals, Inc.

GY is an employee of Rhythm Pharmaceuticals, Inc. and has company-awarded RSU and options.

EC is an employee of Rhythm Pharmaceuticals, Inc. and has company-awarded RSU and options.

CS is an employee of Rhythm Pharmaceuticals, Inc. and has company-awarded RSU and options.

MJA has received payments from Rhythm Pharmaceuticals, Inc., Pfizer, Endo Pharmaceutical, and Conynance for participating in advisory boards and lectures and acting as a consultant. MJA's institution has received research support from Rhythm Pharmaceuticals, Inc., Ascendis, NovoNordisk, Levo Pharmaceuticals, Lumos, Saniona, and Soleno.

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Gene-centric Analysis Revealed a Novel Cause of Syndromic Obesity in Severely Obese Consanguineous Families

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Background/Aims: Previously, we demonstrated that ~50% obese children from consanguineous families of the SOPP (Severe Obesity in Pakistani Population) cohort carried pathogenic mutations in known obesity genes. However, we speculate that children with yet undiagnosed cause may carry pathogenic mutations in additional obesity genes. Here, we employ a novel statistical

approach on exome data of consanguineous pedigrees, to prioritize variants and novel targets with likely involvement in human obesity.

Methods: Analysis and filtration of exome data of 366 severely obese subjects negative for mutations in known obesity genes, were carried out in four stages (Fig. 1). Additionally, molecular dynamics simulation was performed to determine the mutational effect on protein stability and conformation.

Results: Stepwise analyses and rigorous filtration identified *P4HTM* as a candidate obesity gene that harboured, 5 rare (MAF <0.005), homozygous, potentially deleterious mutations in 5 unrelated families from SOPP. Additionally, 2 severely obese subjects of Indian and Algerian origin, were also found carrying mutations in this gene. Three of the 5 probands from SOPP died of severe hypoventilation or pneumonia. The mutated encoded protein is known to cause hypotonia and developmental delay but the effect on weight was not known. All mutations revealed a significant destabilization of the substrate binding region of the encoded protein.

Conclusion: We demonstrate that innovative strategies of sequencing data filtration are powerful tools in identifying candidate obesity genes. Our findings suggest the advisability of screening of *P4HTM* in obese children that also present symptoms of hypotonia, and cognitive impairment, for timely personalized management.

Conflict of Interest: Nothing to disclose.

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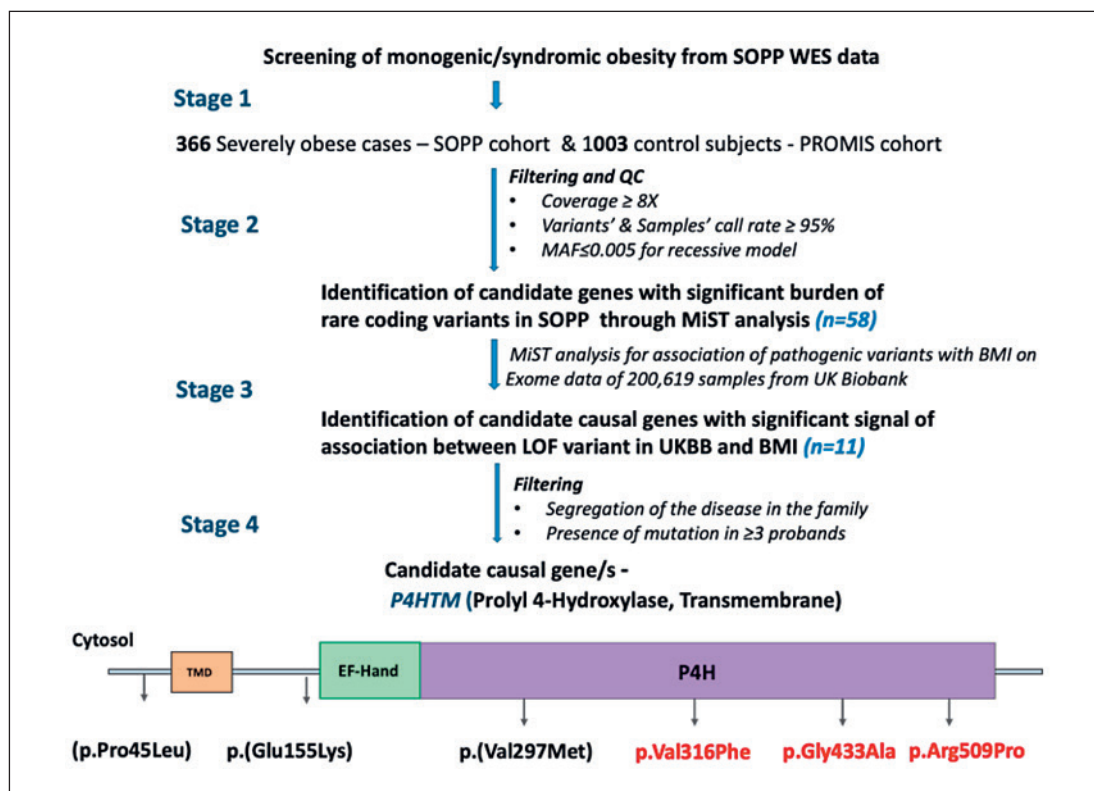


Fig. 1: Schematic presentation of stepwise analyses leading to identification of novel gene in severely obese children. Probands with mutations marked in red are passed away.

High Mortality and Morbidity of Leptin Signalling Deficiency – A Consanguineous Population

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Background/Aims: Proteins encoded by LEP, LEPR are key players in driving the leptin-melanocortin pathway, a disruption of which results in rare but severe form of recessively transmitted monogenic obesity. The long-term evolution of these afflictions is yet unknown. We, therefore, carried out a clinical investigation on

children with deficiency of these proteins to evaluate progression of the disease and its impact on co-morbidities and mortality.

Methods: Severely obese children aged ($\geq 1-15$ years) followed for 1-9 years and 13 family members, with homozygous loss-of-function variants in LEP (n=83), LEPR (n=31) from Pakistan were clinically examined and compared to MC4R mutation carriers (n=18) from the same ethnicity. Serum hormones, leptin, insulin, cortisol, and TSH, and oxidative-stress markers, were determined using ELISA.

Results: High mortality due to severe respiratory or gastrointestinal infections, was reported in 26% of LEP and 9% of LEPR deficient children. The mortality rate in Pakistani children with similar age is $\sim 2\%$. Additionally, 25% of leptin deficient children experienced severe morbidity requiring intensive care. No deaths were reported in MC4R deficiency. In LEP and LEPR deficient children, obesity and hyperphagia manifested at an early age ($< 1-2$ year) compared to MC4R deficiency (4-6 year). Schooling was disrupted due to cognitive impairment. Oxidative stress and DNA damage were more pronounced in LEP deficient children compared to those in the other groups.

Conclusions: This largest cohort of leptin signalling deficient children experienced a distinctly enormous incidence of morbidity and mortality at an early age presumably due to compromised immunity and increased oxidative stress.

Conflict of Interest: None Disclosed.

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Vitamin D intake and sun exposure time: is there any association with the nutritional status of Portuguese children?

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Background/Aims: Vitamin D deficiency is an important public health problem worldwide. Therefore, the aim of this study was to investigate the presence of associations between vitamin D intake and sun exposure time with nutritional status of Portuguese children.

Methods: A cross-sectional study from the project “Inequalities in Childhood Obesity: The Impact of the Socioeconomic Crisis in Portugal from 2009 to 2015” (PTDC / DTP-SAP / 1520/2014) was conducted between 2016 and 2017 in children of both sexes (2 to 10 years). Information about sun exposure and food habits were obtained using standardized questionnaires answered by parents. Trained professionals performed anthropometric measurements and children were classified according to International Obesity Task Force (IOTF) cut-off points. Spearman correlation, Chi-square Pearson and Kruskal-Wallis test were used to assess associations and differences between variables.

Results: A total of 4,789 children (7.09 ± 1.91 years) were included. *Children had consumption of foods rich in vitamin D only twice a month and the intake was not correlated with nutritional status* (p=0.6142; r=0.0073). The average sun exposure time was 210±45 min/day, being higher among schoolchildren compared to preschoolers (p<0.05). There was no correlation between BMI and sun exposure time (p= 0.4417, r= -0.0112) or association with use of vitamin D supplements (p= 0.405) and cod liver oil (p= 0.258) intake.

Conclusion: In view of the limitations imposed by sun exposure, especially in times of pandemic, and given the low intake of vitamin D, more attention should be given to this group in order to ensure adequate status of this vitamin.

Conflict of Interest: The authors declare that they have no Conflict of Interest.

Funding statement: No funding was received for this research.

Pediatric obesity in Spanish low socioeconomic neighborhoods

Presented by: Genís Según^{*1} CO - **Authors:** Yi Chen^{*2}; Clara Homs^{1,4}; Paula Berrueto¹; Mar Ribera¹; Sílvia Torres¹; Santiago Felipe Gómez PhD^{1,3}; PASOS Consortium Researchers

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Background/Aims: Childhood obesity's prevalences are negatively affected by socioeconomic status, this is an obesity predictor as stated by several studies. Moreover, there are gender differences in regards to the overweight and obesity prevalences. This study aimed to compare the prevalence and likelihood of excessive weight, to determine the socioeconomic status, to justify the importance of healthy habits promotion interventions and to analyze gender differences in the prevalence and likelihood of excessive weight.

Methods: A cross-sectional analysis between two cross-sectional studies were carried out. We included 8-12-year-old children from each study. Children's anthropometrics were measured, and their weight status was classified according to different criteria. Univariate, bivariate and logistic regression analyses in SPSS v26.0 were performed.

Results: SEÍSMO participants were in socioeconomic vulnerability, with lower familiar incomes and parental educational level. They also had higher prevalences of overweight (27% [25.5-28.4]), obesity (28.4%, [26.9-29.9]) and abdominal obesity (39.5%, [37.9-41.1]). Relevant gender differences were observed in SEÍSMO. Gender and parental educational level appeared to be positive predictors of higher prevalences.

Conclusions: It is especially relevant to implement and deploy more effective healthy habits promotion interventions, to address correctly the socioeconomic inequalities in the low socioeconomic status neighborhoods.

Intelligence, executive functions, and academic performance according to different weight status in children

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Background/Aims: The objective of this study was to investigate the differences in cognitive outcomes among children with normal-weight and different degrees of obesity (i.e., overweight, mild, severe, and morbid obesity).

Methods: A total of 150 children (10.0±1.2 years; 42% girls) were included in this cross-sectional study. Body mass index (BMI) was categorized as: normal-weight (28.7%), overweight (18.7%), obesity type I (32%), II (12.7%), and III (8%). We assessed intelligence (verbal, non-verbal and total) executive functions (inhibitory control, cognitive flexibility and working memory) and academic performance (academic skills, fluency, application, reading, mathematics, writing and total achievement) with standardized tests. One-way analysis of covariance was performed to analyze differences for all outcomes across BMI categories, adjusting by sex and age.

Results: Compared with their normal peers, children with type II and III obesity had lower verbal intelligence (mean z-score difference: -0.700, 95%CI: -1.180 to -0.219; -0.748, -1.344 to -0.152, respectively), non-verbal (-1.140, -1.637 to -0.643; -0.757, -1.373 to -0.140, respectively), and total intelligence (-1.114, -1.195 to -0.174; -0.967, -1.553 to 0.086, respectively). They also showed lower academic skills (-1.188, -1.697 to -0.680; -0.969, -1.599 to -0.339, respectively) and reading (-1.074, -1.577 to -0.571; -0.956, -1.580 to -0.332, respectively). Executive functions such as inhibitory control (-0.972, -1.435 to -0.509; -0.697, -1.271 to -0.123, respectively) and working memory (-0.999, -1.467 to -0.530; -1.197, -1.778 to -0.616, respectively) were also significantly lower for those children.

Conclusion: Childhood obesity, and mostly severe/morbid (type II/III) obesity, is associated with low intelligence, executive functions, and academic performance.

Conflict of Interest: The authors declare no Conflict of Interest.

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Dietary- but not exercise-induced iso-energetic deficit result in short-term appetitive compensatory responses in adolescents with obesity

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Background/Aims: The aim of this study was to compare energy intake (EI), appetite feelings, and the hedonic responses to equivalent acute energy deficits induced by exercise versus energy restriction in adolescents with obesity.

Methods: In a within-subjects design, twenty adolescents with obesity (12-16 years, Tanner stage 3-5, 9 males) randomly completed three conditions: i) control (CON); ii) deficit induced by diet only (Def-EI); and iii) deficit induced by exercise only (Def-EX). Lunch was calibrated to generate a 400-kcal deficit in Def-EI and remained similar in CON and Def-EX. A 400-kcal deficit was created through a cycling bout set at 65% VO₂peak in Def-EX. Ad libitum EI, macronutrient intake and relative EI (REI) were assessed at dinner, subjective appetite sensations taken at regular intervals, and food reward measured before dinner.

Results: Food intake at dinner was greater in Def-EI (1112 ± 265 kcal) compared to CON (983 ± 277 kcal; p=0.005) and Def-EX (1009 ± 281 kcal; p=0.025). Area under the curve (AUC) for

hunger, desire to eat and prospective food consumption were significantly higher in Def-EI compared with both CON ($p=0.0001$) and Def-EX ($p=0.0001$). AUC for fullness was significantly lower on Def-EI compared with CON and Def-EX ($p=0.0001$). Implicit wanting for sweet food was significantly lower on Def-EX ($p=0.031$), relative to CON.

Conclusion: Appetitive compensatory responses that are observed after iso-caloric energy restriction in adolescents with obesity are absent with acute exercise, which could contribute to optimize the effect of weight loss interventions.

Conflict of Interest: None of the author has to declare any Conflict of Interest.

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Exenatide decreases circulating dipeptidyl peptidase-4 in adolescents with obesity

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Background/Aims: Dipeptidyl peptidase-4 (DPP-4) inactivates glucagon-like peptide-1 (GLP-1). Circulating DPP-4 is elevated in obesity. In obese adolescents, higher DPP-4 is associated with a lowered active/total GLP-1 ratio. DPP-4 originates partly from adipocytes and may be involved in glucose homeostasis. Indeed, DPP-4 inhibitors are indicated for type 2 diabetes. We examined whether the GLP-1 receptor analogue (GLP-1RA) exenatide had an effect on DPP-4 in the circulation of children with obesity and in pancreatic islets.

Methods: Patients were randomized to six-months of exenatide (2mg, $n=22$ randomized, 19 completed) or placebo ($n=22$ randomized, 18 completed). Blood was collected at zero and six-months. DPP-4 was measured using ELISA (R&D systems, Minneapolis, MN). GLP-1 was measured via chemiluminescent enzyme-linked assay (Mercodia, Uppsala, Sweden).

Pancreatic islets were isolated from three brain-dead donors and treated with either palmitate alone for 24 hours (P24) or 24 hours, with exendin-4 (GLP-1RA) added after the initial 12 hours (P12E12). Control islets were not treated with palmitate or exenatide. DPP4 was measured in lysate.

Results: Following treatment, DPP-4 was lowered (-118.9 ± 56.15 ng/mL, $p=0.048$). No difference was seen following placebo. An association was seen between Δ DPP-4 and Δ GLP-1 ($p=0.0012$, $r^2=0.47$).

P24 islets had a protein adjusted DPP-4 of 11400 ± 3328 ng/mL, P12E12 of 6338 ± 2693 ng/mL and control of 8296 ± 1626

ng/mL. However, no statistical difference was seen between the groups.

Conclusion: In adolescents, exenatide decreases DPP-4 after six-months. Concurringly, *in vitro* data show a trend towards a lowering effect on DPP-4 by GLP-1RA in pancreatic islets.

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Gastroesophageal reflux disease and health related quality of life in obese and overweight children

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Background/Aims: Obesity is a major risk factor for gastroesophageal reflux disease (GERD) in adulthood. There is no sufficient data on the occurrence of GERD among obese children. Our aim was to assess the frequency of GERD in children with obesity in a descriptive cohort study.

Methods: We included children aged 7-18 years from April 2020 to August 2020 at Paediatric Endocrinological Outpatient Clinic, University of Debrecen, Hungary. Research time was limited due to COVID. Children and parents completed two questionnaires: 1. adapted questionnaire covering GERD symptoms, 2. quality of life questionnaire (PedsQoL). Patients were divided in two groups: 1. overweight/obese group (BMI percentile >90); 2. normal BMI group (BMI percentile <90). We performed Mann-Whitney and Kruskal-Wallis test to analyse the data.

Results: 116 parents and 109 children (female: 55%, mean age 13 years, IQR: 4.7–18) completed the questionnaires. 48 patients (41%) were obese, 68 patients (59%) had normal BMI. Rate of endocrine disorders was similar in the groups (79% vs. 80%). Mean score of GERD questionnaire was higher in obese children than in the normal BMI group (3.9 vs. 2.7; $p < 0.05$). PedsQoL score was significantly lower in obese children ($p < 0.05$). There was a significant positive correlation ($p < 0.05$) between BMI percentile and GERD questionnaire score. We also found a significant negative correlation between BMI percentile and PedsQoL ($p < 0.05$).

Conclusion: Obesity was associated with GERD symptoms and lower quality of life. Promotion of weight loss is crucial in order to prevent long-term complications and improve the symptoms of GERD and quality of life.

Conflict of Interest: None Disclosed.

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Talking with pediatric patients with overweight or obesity and their parents: perceived self-efficacy and barriers of Dutch healthcare professionals from seven different professions. A self-report study

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Background/Aims: Many healthcare professionals (HCPs) feel uncomfortable to talk about weight with children with overweight and obesity and their parents. To optimally target interventions that can improve childhood obesity care, we assessed the self-efficacy (SE) and perceived barriers (PBs) of Dutch HCPs in regard to talking about weight and lifestyle when treating children with overweight or obesity. Additionally, we analyzed interdisciplinary differences.

Methods: A newly developed, practice- and literature-based questionnaire was completed by 578 HCPs of 7 different professions. Kruskal-Wallis, t-tests and chi-square tests were used to analyze interdisciplinary differences on SE, PBs and the effort to discuss weight and lifestyle despite barriers.

Results: On average the reported SE was 7.2 (range 3-10; scale 1-10), and the median number of different PBs was 4.0 (range 0-12; out of 17). The majority of HCPs (94.6%) reported that they perceived one or more barriers.

HCPs who perceived too many barriers to discuss the weight and lifestyle of the child in the majority of cases (9.6%, $n=55$), reported a lower SE (mean 6.3), as compared to professionals who were likely to discuss these topics (mean SE 7.3, $p < 0.01$), despite a similar number of PBs. In total, 6.9% ($n = 38$) felt incapable (i.e. rated their SE ≤ 5) to successfully address the topic.

Conclusions: Although on average Dutch HCPs rated their self-efficacy fairly good, for a subgroup major improvements are necessary to lower perceived barriers and improve their self-efficacy, aiming to improve the quality of care for Dutch children with obesity.

The Cortisol Stress Response in Youth with Overweight and Obesity: Influence of Psychosocial Variables

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Background/Aims: Despite previous research pointing out a bimodality in cortisol stress reactivity, it is not yet clear if all variables explaining inter-individual differences in stress responses are fully captured. Therefore, the current study focuses on cortisol responses after a standardized stress- and affective state (SAS)-induction in youth with overweight and obesity to explore (1) whether the expected two groups (cortisol increasers and

decreasers from baseline to reactivity) exist in this sample, (2) whether they differ regarding demographics and psychosocial variables, and which variables predict the strength of cortisol response and (3) whether an emotion regulation (ER)-training influences cortisol response.

Methods: As part of a randomized control trial (SRCTN83822934) investigating the effects of an ER-training on top of a ten-month inpatient multidisciplinary obesity treatment, 79 children and adolescents (9-15 years) completed a SAS-induction.

Results: Those whose cortisol levels decreased ($N=59.5\%$) from baseline to reactivity showed higher levels of alexithymia than increasers ($p=.049$). Attachment avoidance was a significant positive predictor of relative cortisol decrease after SAS-induction ($p=.001$). Conversely, age was significantly related to less cortisol decrease ($p=.006$). No significant effect of ER-intervention group on relative cortisol change was found.

Conclusions: The current study provides evidence for a bimodality in cortisol stress reactivity in youth with obesity. Our data further suggested that psychosocial variables (alexithymia and attachment avoidance) influence the cortisol stress response. Future research should further explore the influence of ER-training on cortisol reactivity in youth with obesity as it may lead to important clinical implications.

Conflict of Interest: None Disclosed.

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Associations between a Body Shape Index and cardiometabolic risk factors in Greek pediatric population with excess weight

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Background/Aims: A novel Body Shape Index (ABSI) (waist circumference (m) / [body mass index^{2/3} * height (m)^{1/2}]), seems to be a substantial predictor of mortality risk in general population. Our aim was to investigate the association between cardiometabolic risk parameters and ABSI among Greek children and adolescents with obesity.

Methods: WC, WHtR, BP and lipid profile were measured and BMI, HOMA-IR, ABSI, TyG and HTGW phenotype were calculated in a sample of 141 children with mean age 10.2 \pm 2.31 years, with obesity. Student's t-tests were used for the comparison of means and Chi-square tests for the comparison of proportions. Univariable and multivariable linear regression analyses, adjusted for age, sex and puberty, were utilized to test the association between ABSI and cardiometabolic risk factors.

Results: WHtR and WC $\geq 90^{\text{th}}$ were higher in boys ($p=0.005$ and $p=0.056$), as well as ABSI mean ($p<0.001$). On the contrary,

ABP \geq 90th was higher in girls ($p=0.031$). The ABSI mean was higher in children with WC \geq 90th and lower in children with ABP \geq 90th. We found no significant difference in ABSI among children with and without MetS or HTGW phenotype, nor with HOMA-IR $<$ or \geq 2.5. In the multivariable linear regression analyses, ABSI was positively associated with WHtR ($p<0.001$) and negatively associated with DBP ($p=0.029$). No associations were found between ABSI and TyG, TC, HDL, LDL and TG.

Conclusions: In accordance with studies in adult population and in contrast to studies in general pediatric population, ABSI was not correlated with established cardiometabolic risk factors in this group of children with obesity.

Conflict of Interest: None Disclosed.

Funding: No Funding.

Factors influencing follow-up and dropout in children and adolescents with essential obesity

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Background/Aims: Pediatric obesity is associated with an increased risk of serious long-term complications. Therapeutic failure is influenced by several factors, such as the high dropout rate. The aim of the study was to evaluate the rate of drop-out and to research related factors in obese children.

Methods: It is the retrospective, one center study of 489 obese children. The auxological data were collected during the first (V1) and the last visit (V2). Drop-out was defined as a follow-up of less than 12 months and/or including less than 1 visit every 6 months. The patients were divided: Group A of drop-out (297) and Group B of non-drop-out (192).

Results: The mean duration of follow-up was 20.8 \pm 23.2 months. Drop-out rate was 60.7%. The remaining patients completed follow-up in 12-24 months. In group A, SD BMI and percentage of patients with BMI \geq 3 SD at V2 were significantly higher than in group B ($p=0.002$ and $p=0.027$, respectively). In Group B, the percentage of patients with pathological HOMA-IR was significantly higher than in Group A (51.1% vs 41.3%; $p=0.036$), as well as subjects with fasting glucose $>$ 100 mg/dL. (16.5% vs 8.9%; $p=0.012$). The likelihood of drop-out was positively associated with pubertal stage at V1 (OR 1.39) and negatively with a fasting blood glucose $>$ 100 mg/dl and insulinemia $>$ 15 uI/ml at V1 OR 0.52 and OR 0.64 respectively). A negative association was found between weight loss and age $>$ 10 years and a positive association between weight loss and non-pathological HOMA-IR.

Conclusion: The study demonstrated a high drop-out rate during follow-up, mainly among adolescents and patients without glucometabolic alterations. These obese patients will need closer monitoring and possible counseling to avoid early abandonment.

Conflict of Interest: None Disclosed.

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Metformin reduced proinsulin to insulin ratio in children with obesity, improving glucose tolerance

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Background/Aims: Disproportionately elevated serum proinsulin compared to insulin is closely related to beta cell dysfunction and glucose intolerance. We investigated how metformin affects proinsulin and proinsulin: insulin ratio in children with obesity by using a translational approach.

Methods: Participants with obesity who had received metformin for at least six months ($n=25$, age 13.9 \pm 1.7years) were grouped as having normal glucose tolerance (NGT), impaired glucose tolerance (IGT) or Type 2 Diabetes(T2D). Fasting proinsulin, insulin, glucose, 2h-glucose, HbA1c were measured and proinsulin: insulin ratio and oral disposition index were calculated before and after treatment.

Isolated human pancreatic islets were exposed to 25 μ M palmitate for 0.5, 1, 2 or 3 days to induce insulin hypersecretion. Metformin was introduced after 0.5 day of palmitate exposure and supernatant was collected at the last 12h of each culture conditions. Proinsulin and insulin were measured from the samples.

Results: In children with obesity fasting proinsulin significantly increased with the deterioration of glucose tolerance. The proinsulin/insulin ratio was reduced by 20% ($p=0.03$) by metformin in IGT. The alteration of proinsulin/insulin ratio was positively associated with change of HbA1c ($r^2=0.31$, $p<0.004$) and 2h-glucose ($r^2=0.17$, $p=0.03$) under metformin treatment.

In the islet experiments, proinsulin to insulin ratio increased by 65% in presence of palmitate for 3 days ($p=0.03$), which was significantly reversed to control levels by 2.5 days' metformin intervention ($p=0.03$) Similarly, metformin treatment significantly reduced enhanced palmitate-induced proinsulin secretion (from 64 to 36 pmol/ μ l/ μ g, $p=0.02$).

Conclusion: In pediatric obesity the proinsulin/insulin ratio was reduced by metformin treatment, along with improvement in 2-hour glucose and HbA1c levels in children with obesity and IGT.

Conflict of Interest: None Disclosed.

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Children cardiometabolic patterns at 5 years and their association with birth weight

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Background/Aims: Children cardiometabolic health parameters have been mostly studied individually in relation to early life factors while they may cluster into different phenotypes not driven only by adiposity variability. We aimed to describe cardiometabolic health patterns (CMHP) in 5-years old children and examine their relationships with birthweight.

Methods: A subsample of the EDEN birth cohort study was analyzed (n=1,120). Children birthweight was obtained from maternity records and customized gestational age specific z-scores (Gardosi et al., 2008) were calculated (z-BW). During the 5-y clinical examination, adiposity markers (body mass index, body circumferences, skinfold thicknesses, %fat mass from bioelectrical impedance analysis) and blood pressure were measured. Fasting glycemia, triglycerides, high-density lipoproteins, serum insulin and leptin levels were also measured. Insulin resistance (HOMA-IR), low-density lipoproteins and age at adiposity rebound were further derived. CMHP were defined using principal component analysis. Associations between z-BW and children CMHP were studied using linear regressions adjusted for parental health and socioeconomic context.

Results: Four CMHP were identified: “adiposity”, “low glycemia-unbalanced lipids”, “overall metabolic disorder”, and “high blood pressure-balanced lipids”. Higher z-BW was related to lower “overall metabolic disorder” ($\beta=-0.10SD, 95\%CI=[-0.17;-0.04]$) and “high blood pressure-balanced lipids” ($\beta=-0.10SD, 95\%CI=[-0.16;-0.04]$) scores. Positive albeit non-significant associations were found between z-BW and “adiposity” ($\beta=0.10SD, 95\%CI=[-0.03; 0.23]$) and “low glycemia-unbalanced lipids” ($\beta=0.06SD, 95\%CI=[-0.01; 0.12]$) scores.

Conclusion: Children cardiometabolic health parameters clustered into more than one pattern. These patterns were associated differently with birthweight suggesting different physiological pathways involved in their programming. Investigating the influence of early life factors on children CMHP is of great relevancy for future primary prevention purposes.

Conflict of Interest: None Disclosed.

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Food Literacy, Food Purchasing and the Home Food Environment in Maltese Young Adults

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Introduction: Food literacy (FL) encompasses behaviours, skills and knowledge required to prepare, purchase and consume healthy foods (Vidgen & Gallegos, 2014). Poor dietary behaviours can start at a young age; therefore, it is crucial to enhance FL to prevent excessive weight gain later. The aim of this study was to explore FL and the home food environment in Maltese young adults (18–25 years).

Methods: A self-reported questionnaire was disseminated, following ethical consent, on social media during the period October–December 2020. The data was then statistically analysed using SPSS® (IBM®, version 21).

Results: The respondents (n=208) were predominantly female (n=149, 71.3%), tertiary educated (n=133, 64.5%) and living with their family (n=193, 96%). Approximately a third reported body mass indices in the overweight or obese category (28%, n= 58). The overall median score for FL was 20 (within a scale of 6–30). 70.6% (n=142) were not aware of the salt content in specific foods. The main food purchasing considerations were health and quality (65%, n=135) and taste (n=115, 55%). The most frequently consumed foods at home were fruit (67%, n=138) and vegetables (66%, n=137) and 24% (n=49) reported that they often bought takeaway food.

Conclusion: There is need for further improvement in FL, considering these participants were predominantly of higher education levels. Suggestions are for targeted nutrition and food education campaigns in key groups. Further similar research in lower socioeconomic local groups is encouraged.

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Reference

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A shifted in parental perception of their child's weight status: a repeated cross-sectional study in Portugal, 2009–2016

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Abstract: Parental perceptions of child's weight status may influence family readiness to foster healthy behaviors. This study investigated the parental perceptions about children's weight in 2009/10 and 2016/17 in different population subgroups. Data were

collected in two national projects 2009/10 (n=6577) and 2016/17 (n=7594). Using a standardized questionnaire, parents were asked whether they considered their child, ages 6 to 10 years, to have underweight, overweight, obesity or just about the right weight. The IOTF cut-offs were used for reference. Parental perception of their child's weight was significantly more accurate in 2016/17 than in 2009/10, except in children with obesity, where the prevalence of children correctly perceived as such by the parents declined by approximately 50%. This study points for a declining in the accuracy perception of parents to perceive children with obesity appropriately. Strategies are needed to encourage parents to improve their perception about appropriate weight for their child.