

STEMMING THE RISE IN CHILDHOOD OBESITY – RECOGNISING AND ADDRESSING THE CHALLENGES



By Dr. Mars Silva Skae

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Childhood obesity is not an illness that many care to deal with because the solution to solving it lies in unravelling the effects of deprivation, socioeconomic status and societal lifestyle habits that serve to fuel the problem. Were it not for my faith in the most inspiring person of Jesus Christ, who chose to address societal inequalities with bold and brave concepts that challenged the norms 2000 years ago whilst acting as the ultimate physician, I would not have chosen to pursue this path.

I hope this work celebrates:

FAITH, FAMILY, FRIENDS and SCIENTIFIC ENDEAVOUR.

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Abbreviations and glossary:

ADF – Alternate day fasting
BCH – Boston Children’s Hospital
BED – Binge Eating Disorder
BMI – Body mass Index
BP – Blood pressure
CBT – Cognitive behavioural therapy
CCG – Clinical commissioning group
CCH – Cincinnati Children’s Hospital
CDC – US Centres for Disease Control and Prevention
CER – Continuous energy restriction
CME – Continuous medical education
CVD – Cardiovascular disease
ED – Eating Disorders
EU – European Union
GI – Glycaemic index
GL – Glycaemic load
GR – Glycaemic response
GORD - Gastroesophageal reflux disease
HC – High carbohydrate
HCP – Healthcare professional or healthcare provider
HP – High protein
HFSS – High fat, sugar and salt
HRQoL - Health-related quality of life
IER – Intermittent energy restriction
IF – Intermittent fasting
IHH – Idiopathic intracranial hypertension
IOTF – International obesity task force
IT – Information technology
MBS – Metabolic bariatric surgery
MDT – multidisciplinary team
MI – Motivational interviewing
NAFLD - Non-alcoholic fatty liver disease
NASH - Non-alcoholic steatohepatitis
NCMP - National Child Measurement Programme
NHS – National Health Service
OECD - Organisation for Economic Cooperation and Development
OSA – Obstructive sleep apnoea
PA – Physical Activity
QoL – Quality of Life
RMCH – Royal Manchester Children’s Hospital
SCFE - Slipped capital femoral epiphysis
T2DM – Type 2 Diabetes Mellitus
TRE – Time restricted eating
TRF – Time restricted feeding
UK – United Kingdom
US or USA – United States of America
WCMT - Winston Churchill Memorial Trust
WHO – World Health Organisation
WS – Whole-systems

Bioprofile: Dr. Mars Silva Skae



Mars Skae is a consultant paediatric endocrinologist at the Royal Manchester Children's Hospital (RMCH), which is one of the largest dedicated children's hospitals in the UK and Europe. She is the clinical lead for paediatric obesity at RMCH and works with a multidisciplinary team tackling obesity. She works closely with Manchester City Council initiatives to improve the care and prevention for children with obesity in Manchester and is currently the topics advisor for the next National Institute of Health and Clinical Excellence (NICE) obesity guideline.

Read some of her work on her blog site at:

www.thepracticalpaediatrician.wordpress.com

Executive summary / Abstract:

Introduction: Childhood obesity is a global pandemic that is on the rise and is the most serious public health challenge facing healthcare in the 21st century. The number of obese children aged 5-19 years has increased by tenfold over the last 40 years. The UK currently ranks 9th worst affected by childhood obesity amongst 34 countries assessed in the world.

In Europe, a number of successful city-wide approaches have been published including recent efforts in Amsterdam. However most approaches focus on prevention and public health interventions with very little published on approaches within childhood obesity weight management services tackling children on the more extreme ends of the spectrum.

The aim of this fellowship was to visit two world class centres dealing with childhood obesity (The Optimal Wellness for Life centre at Boston Children's Hospital and the New Balance Centre for Health at Cincinnati Children's Hospital) to observe multidisciplinary methods in managing childhood obesity and modify tools and techniques used against current published scientific literature, in order to develop robust approaches to tackling the issue in the UK. A further aim was to analyse strategies developed by the Amsterdam group to identify key approaches that have led to a successful strategy in a city with a similar population demographic to Manchester and London.

Results: Key service-model findings include the use of complete multidisciplinary approaches to consulting with patients and families with obesity. The scale of the problem at both US centres was far greater than that encountered in the UK. Funding models for the development of services included funding from relevant stakeholders, which facilitated service interventions in the community derived outside of the healthcare purse. Each service hence was able to extend their practice into schools or community services to ensure a unified approach that merged into the community.

Key consultations styles included motivational interviewing techniques. Communications attempted to change the narrative to one that was focussed on health rather than size, and shifting approaches from punitive ones to those that involved self-empowerment, with individualised targeted plans.

Dietary modification packages were based on low glycaemic index (GI) strategies, with the provision of appropriate tools such as meal plans for patients to explore, hence empowering patients to make changes that were more easy achievable.

Analysis of the Amsterdam project demonstrated success through a whole-systems approach that had clear engagement from multiple stakeholders, with defined short, medium and long-term aims, making progress more measurable. Underpinning the project was heavy involvement of the lead political figure (Mayor) acting as the driver for the project's development and delivery.

Conclusions: Successful management of overweight and obesity requires a change in approach from one that is perceived as derogatory or punitive to one that has a positive influence toward better health as its focus. For those worst affected, approaches need to be driven through healthcare using dedicated multidisciplinary teams that provide unified, simple approaches that are achievable, affordable, sustainable with clearly defined outcomes. At the same time they need to empower individuals to recognise need for change and identify changes that they can subscribe to, in order to make decisions that are personalised. On an individual level, dietary changes need to be easy, achievable, affordable and sustainable and the best approach to achieve this and to reduce obesity related comorbidities is by using a low GI diet and time restricted eating approaches. Concurrent use of exercise is essential for the benefits of general wellbeing and increased caloric burn but alone is limited in its effect on achieving healthy weight. At city-wide and national level, the involvement of key political figures driving change at the helm of a multifaceted population lifestyle change agenda is needed. This cannot continue to be neglected, as has been done in the UK, if effective change is to happen toward a positive cultural shift toward healthy living across the population, starting with children.

Introduction

Childhood obesity – the story so far

Childhood obesity is a global pandemic that is on the rise. Although it is perceived as a benign condition, it is one of the most serious public health challenges facing healthcare in the 21st century.

Globally, the World Health Organisation (WHO) states that the number of overweight and obese young children (pre-primary school age - 0 to 5 years) has increased by 9 million from 1990 to a total of 41 million in 2016, and numbers are continuing to rise. Further concern is raised by the rate of rise which is reflected by the tenfold increase of the number of obese children aged 5-19 years globally between 1975 and 2016 (5 million to 50 million in girls and 6 million to 74 million in boys). Although there has been a degree of plateauing in numbers in the most affected countries, particularly those in the developed world, there has been no decline in rates to date.(1)

The United Kingdom (UK) currently ranks 9th for overweight prevalence (including obesity) in children aged 2 to 19 years amongst the 34 Organisation for Economic Cooperation and Development (OECD) countries when body mass index (BMI) thresholds are applied as per the International Obesity Task Force (IOTF).(2)

The WHO found in a study of 53 nations published in 2018, that the UK is the third fattest nation in Europe. Only Malta and Turkey rank higher than the UK in the 'obesity league tables'.

The Royal Society of Public Health confirmed in their report 'Health on the Shelf' in 2019 the statistics from the UK Department of Health which highlights that the prevalence of obesity in children aged 2-15 rose steadily in the UK from 1995 to 2005, when it reached its peak at around 18% for both boys and girls. The most up-to date figures from the 2018/2019 NCMP data show that 9.7% of Reception (4-5 year olds) and is continuing to rise whilst 20.2% of year 6 pupils (10-11 year olds) are obese.

The reason this is a pressing issue is because obesity has been demonstrated to track through childhood and adolescence. The concern therefore arises that obese children will be at risk of adverse outcomes which may begin to develop in childhood with short, medium and long term effects that will persist into adulthood.

In early childhood, overweight children are likely to suffer from respiratory conditions such as asthma and sleep apnoea. The latter in particular can impair sleep quality, rest and hence daytime concentration and learning capacity. In the medium term, children can suffer from poor quality of life. Stigmatisation and mental health issues such as reduced self-esteem and depression can occur as obese children are more likely to be bullied when compared to their normal weight peers. This can also have longer term consequences through its impact on reducing educational and lifetime achievement. Lastly, for those in whom childhood obesity persists into adult life (which occurs in over half of those affected), the condition is linked to more serious health conditions with increased cardiovascular risk such as ischaemic heart disease, high blood pressure and stroke and other conditions with multiple long term complications such as type 2 diabetes and certain cancers.

The Scale of the Problem in the UK - National Child Measurement programme (NCMP) data for 2018/2019

The UK NCMP was launched in 2005 and has been the UK's main means of tracking obesity rates amongst primary school aged children and currently holds 13 years of data. The latest report for 2018/2019 provides the latest data on rates of obesity at the time of this publication. In children aged 4-5 years (reception), the prevalence of obesity has risen to 9.7% indicating that nearly 1 in 10

children in that age group are affected. In children aged 10-11 years (Year 6), the prevalence has stabilised and continues at 20.2%, indicating that 1 in 5 children are affected. Although numbers have stabilised amongst those in the older age group, overall numbers double between reception and Year 6.

Prevalence in both groups was higher in boys compared to girls, and there is a stark correlation between deprivation and obesity with a doubling of obesity rates between those living in the least deprived communities and those most affected by deprivation. Urban areas were most affected and the prevalence in black populations is higher than in other ethnic groups.

Geographical analysis found the 5 worst affected regions for obesity prevalence to be in the North East (33.6% of those measured), West Midlands (33.5% of those measured), London (33.4%), North West (32.1%) and Yorkshire and Humberside (31.2%). Least affected areas included the South West, South East and East of England.

What has the UK government been doing about this epidemic?

In August 2016, the UK government launched its much anticipated Childhood Obesity Plan (A plan for action).(3) At the time, it was estimated that in England the NHS had spent £5.1 billion on overweight and obesity-related ill-health in 2014/15, which was more than that spent on the fire service, police and judiciary put together.(4,5)

The plan to reduce childhood obesity was set to be achieved by a number of strategies involving food industry changes and initiatives namely:

1. Introducing a soft drinks industry levy to encourage food producers to reduce the amount of sugar in their beverages and move consumers toward healthier alternatives. The monies generated were to be reinvested in obesity reduction activity programmes.
2. A sugar reduction programme aimed at the food industry starting with a target of a 5% reduction of sugar in all foods by the end of year 1 and aiming to achieve a reduction of 20% by the year 2020.
3. Supporting innovation to make food products healthier through £10million in research grants.
4. Making healthy options available in the public sector by designing food environments that easily promote healthy choices.
5. Providing support with the cost of healthy food through the Healthy Start Scheme with an investment of £60million in vouchers for families with low incomes.
6. Encourage an hour of physical activity a day and improving coordination of sport and physical activity programmes in schools.
7. A new healthy rating for schools as part of the Ofsted inspections.
8. Making school food healthier.
9. Clearer food labelling – however this was still on a voluntary basis within the food industry.
10. Using technology for example the use of the Change4life sugar app.
11. Enabling health professionals to have conversations and support families in tackling with obesity through resources such as 'Make every contact count'.

In June 2018, the second phase of the Childhood obesity: a plan for action was launched.(6) A new national ambition to halve the rates of childhood obesity by 2030 was set. Further focus was set on a number of areas:

1. Sugar reduction – further possible measures were outlined such as a sugar levy on sugary milk drinks (such as milkshakes), legislation to stop energy drinks being sold to children, and

further taxes to encourage healthy food production. Nevertheless no definitive decisions were made and the targets set in the previous paper were not met (5% reduction of sugar in the first year).

2. Calorie reduction – it was felt that there should be focus not just on sugar but on the whole diet through the use of whole energy consumption measures, with a challenge to the food industry to reduce calories in everyday foods by 20% by 2024. Further legislation to make food labelling a requirement was to be considered but once again this has not been taken further.
3. Advertising and food promotion – to prevent negative influences on food choices, a consultation on food advertising before the watershed period (9pm) was to be undertaken with investigation of potential restrictions on other media advertising platforms to protect children. However once again, no further movement has taken place regarding these matters despite the intention. In order to promote a food safe environment, the promotion of unhealthy foods high in fat, sugar and salt (HFSS) in high visibility areas in stores such as entrances, checkouts and end of aisles was to be discouraged.
4. Local area solutions – to be tackled by developing trailblazer programmes with local authorities, to develop resources that support local authorities to develop healthy food environments, design greater active travel and safe physical activity spaces.
5. Schools – further support for healthier meals in schools and 30 minutes of daily physical activity for children in schools.

Why is childhood obesity a concern?

Obesity is a complex disease with multifactorial causality and multiple comorbidities. Children who have obesity are more likely to have the following: (7)

1. Increased risk of impaired glucose tolerance, insulin resistance, and type 2 diabetes (T2D).

Childhood obesity is linked directly to an increased risk of T2D, which is a predictor of cardiovascular disease (CVD) events in later life such as heart attack.(8) T2D has a significantly worse prognosis in adolescents than in adults, with adolescents showing a 4 times faster decline in beta-cell function in the pancreas than that seen in adults, while end organ injury, such as kidney disease, occurs earlier in adolescents than adults and fails to respond to medical therapies as well. The TODAY study demonstrated that early onset T2D at the age of 10years, which is usually preceded by a period of insulin resistance, raises risks of T2D related comorbidities by age 15. Incidence rates in this group were found to be 16%–39% for microalbuminuria; 35%–46% for hypertension; 62 - 66% for blood lipids; 14% for retinopathy and 8% for peripheral neuropathy compared to nearly 0% for the general population.(9,10)

2. Respiratory issues such as asthma, sleep disordered breathing and obstructive sleep apnoea (OSA).

Up to a third of children and adolescents with obesity may have OSA.(11)

3. Non-alcoholic fatty liver disease (NAFLD), non-alcoholic steatohepatitis (NASH), gallstones, gastro-oesophageal reflux (i.e., heartburn) and constipation.

NAFLD and NASH may be present in at least 59% of adolescent patients as demonstrated by the Teen-LABS bariatric surgery cohort.(12) NAFLD represents a wide spectrum of liver disease that ranges from fatty liver to advanced fibrosis, cirrhosis leading to hepatocellular cancer and end-stage liver failure in later life. It could therefore be the next big cause of liver related deaths in the future if obesity rates continue to rise. Also, gastroesophageal reflux disease (GORD) is commonly associated with obesity and thought to be caused by increase intraabdominal pressures. This may be a common problem that is not usually noted as a comorbidity of obesity and could be treated with appropriate medical treatments such as proton-pump inhibitors. Nevertheless, weight loss improves GORD and is the intervention of choice.

4. High blood pressure and high cholesterol, which are risk factors for cardiovascular disease (CVD).

When children have a BMI >95th percentile, their risk of CVD mortality at age 50 years is multiplied by 3 to 5 times of the norm.(13)

5. Idiopathic intracranial hypertension (IIH) or pseudotumour cerebri.

IIH is an elevated intracranial pressure without a clear cause. IIH is linked with obesity and can lead to permanent visual impairment or blindness.(14)

6. Joint problems and musculoskeletal pain.

Blount's disease (tibia vara) and slipped capital femoral epiphysis (SCFE) are diseases associated with childhood obesity and can cause significant mobility issues. Musculoskeletal pain in obese adolescents can affect QoL significantly and also further fuel inactivity leading to increased obesity.(15)

7. Psychological issues such as social stigma, low self-esteem, depression and poorer quality of life.

Severely obese adolescents report a severe reduction in health-related quality of life (HRQoL) with lower self-esteem, poor body image, social stigma and bullying.(16)

8. Infertility in both sexes and polycystic ovarian syndrome.

Obesity is known to be related to reproductive problems in both sexes and include menstrual irregularities, pregnancy complications and infertility due to anovulation in women, and lower testosterone and reduced sperm counts in men. Studies indicate that these individuals have lower gonadotrophin results suggesting a central dysregulation of the hypothalamus-pituitary-gonadal axis.(17)

What are the causes of childhood obesity?

The causes of childhood obesity are multifactorial. The vast majority of cases of childhood obesity are due to a mismatch between energy (calorie) consumption through eating and drinking and energy expenditure (physical activity and metabolism). Genetic factors may cause a predisposition to obesity, however they have always been present in society; nevertheless, the rates of childhood obesity have only increased significantly the 1980s, suggesting other causative factors. The rising rates of childhood obesity since the 1980s have been due to changes in food habits (increasing food portion sizes, increased consumption of sugar and fat in diets and snacking), greater use of non-energy expending methods of transport (motorised vehicles) and the increasing use of information technologies (IT) in industry leading to a reduction in the need for daily manual labour in the workplace, the increased use of modern conveniences in the home to replace daily tasks and chores, and the use of screen-based technologies for learning and entertainment (television, computers, gaming devices), leading to more sedentary lifestyles generation upon generation.

Environmental influences such as deprivation are significant associated factors for many. A person's socioeconomic status and community food availability such as fast-food outlets and corner shops that are poorly stocked with healthy foods can affect their obesity predisposition.(18) Where people live can affect their ability to make healthy choices. In poorer communities, the lack of accessibility and affordability of healthy food can affect nutritional status in children. Lack of physical activity in these communities may also be due to lack of facilities such as walking areas, bike paths, and safe parks. Changes in parental lifestyles, such as the increasing necessity for both parents in a household to work, have led to increased consumption of processed foods due to the lack of time to cook as well as less healthy eating habits such as family members grabbing meals separately instead of eating as a family at the table at fixed meal times.

Regular places of care for children such as child care centres, nurseries and schools can affect diet and activity through the foods and drinks they offer and the opportunities for physical activity they provide. Most children spend up to half of their day in such institutions and may consume up to two thirds of their daily caloric requirements in these places. Therefore, they play a major role in the lives of children and can significantly influence their obesity outcomes.

Other external factors can include marketing and advertisement messaging which can negatively influence household purchasing habits. Additional biological factors that increase the obesity risk include reduced sleep.(19–21)

In addition, tragically the childhood obesity agenda for change appears to be extremely dependent on political trends. Although only speculative, the lack of published updates and development of an action plan for obesity by the US CDC, with little US Federal policy change since 2015, seems to time almost perfectly with changes in the US government and the US election political agenda, followed by the start of the Trump administration.

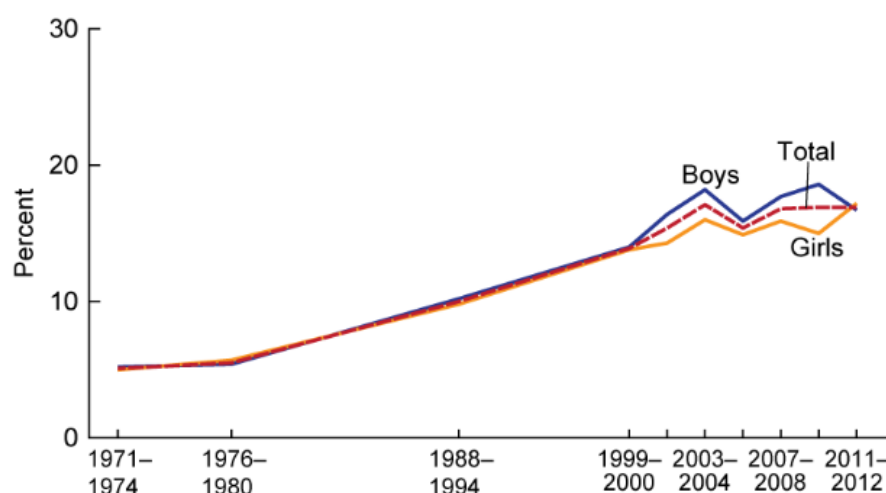
A similar trend has been seen in the UK with the UK with the first chapter of the Childhood obesity plan finally published in 2015, a plan for action published by the UK government in 2016, followed by a long pause due to Brexit and political unrest with a long awaited second chapter of the Childhood Obesity plan published in 2018 only toward the end of the May government. However, significant amounts of work invested in those strategies were nearly overturned by a change in the government with the onset of the Johnson government in 2019 with threats to abolish the sugar tax.

As I currently write this report, I can only seek solace in the fact that since the onset of the global COVID-19 pandemic with Prime Minister Johnson himself contagating this life-threatening virus and its clear association with obesity in adults, the obesity agenda in the UK is once again coming to the forefront of the political health agenda.

The Scale of the problem in the United States of America (USA)

2015-2016 data showed that the prevalence of obesity among U.S. youth was 18.5%. Overall, in school-aged children (6–11 years) the prevalence was 18.4% which was higher than among preschool-aged children (2–5 years) 13.9%; whilst the prevalence of obesity among adolescents (aged 12–19 years) was 20.6%. This indicated that nearly 1 in 5 school-age children and young people aged 6 to 19 years in the United States is obese.(23)

Data from the US indicate that obesity rates in children and young people have more than tripled there since the 1970s.(22)



NOTE: Obesity is body mass index greater than or equal to the sex- and age-specific 95th percentile from the 2000 CDC Growth Charts. SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys 1971–1974; 1976–1980; 1988–1994; 1999–2000, 2001–2002, 2003–2004, 2005–2006, 2007–2008, 2009–2010, and 2011–2012

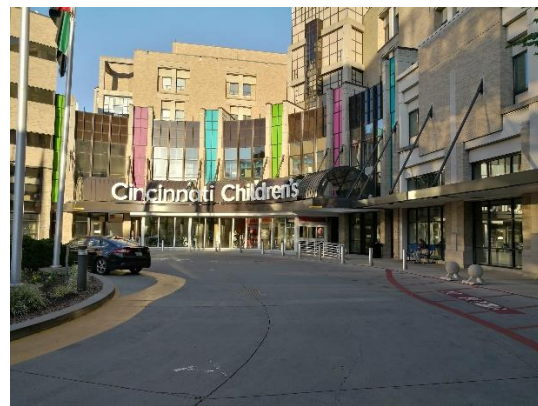
FIGURE 1. TRENDS IN OBESITY AMONG CHILDREN AND ADOLESCENTS AGED 2–19 YEARS, BY SEX: UNITED STATES, SELECTED YEARS 1971–1974 THROUGH 2011–2012

Since 2015, the childhood obesity plan for action has appeared to have stalled nationally and limited new data has been generated within the public domain from the Centres for Disease Control and

Prevention (CDC) in the US. However, the severity of this problem and its early recognition by our US counterparts in the late 80s, led to the development of specialist childhood obesity services at larger centres in the 90s.

It is difficult to compare the scale of the problem in the US directly to the UK for a number of reasons such as data collection time and age group differences, however in general the prevalence of obesity in younger preschool children appears to be approximately 3-4% higher in US preschool children when compared to the UK. Nevertheless, in older primary school aged children, UK figures if anything surpass those of US children. The UK has no readily up to date data on secondary school aged children, but it is highly likely that this will follow similar trends as the US, with an even higher prevalence than that in primary school aged children.

Aims of this project:



The aim of this fellowship was to visit two globally reputable centres dealing with childhood obesity to 1. observe multidisciplinary methods in managing childhood obesity, 2. to acquire and modify tools and techniques used there whilst appraising them against current published scientific literature in order to 3. develop robust approaches to tackling the issue in the UK. The two centres visited were The Optimal Wellness for Life centre at Boston Children's Hospital and The Centre for Better Health and Nutrition (CBHN) and the 'Healthworks!' weight management programme at Cincinnati Children's Hospital. Both centres were chosen as sites to visit for the fellowship based on 1. the reputation of the centres and the age and experience of their services 2. availability of medical observership programmes that were accessible and well-coordinated and 3. access to introductions and recommendations to clinicians at both sites.

The Optimal Wellness for Life (OWL) centre (previously known as the Optimal Weight for life Centre) at Boston Children's Hospital (BCH) is a multidisciplinary team (MDT) clinic that aims to improve the health and wellbeing of children with complications of obesity such as insulin resistance, type 2 diabetes and obesity related comorbidities. The service was established over two decades ago in 1996 and is one of the oldest known MDT services in the world. This service has a very similar purpose to the clinical service I work in and across specialised paediatric services in the UK that tackle severe childhood obesity. This service also has strong links to obesity research based at Harvard University and Harvard Medical School which strengthens the evidence base around their practice. For this reason, I felt it would be a good clinical model to conduct the fellowship at.

The Healthworks! Programme at Cincinnati Children's Hospital was also observed as one facet of a much larger programme for better child health. This had community based clinics, with attendance at more specialist obesity comorbidity related clinics (the under 5's specialist obesity clinic, the non-

alcoholic steatosis hepatic (NASH) clinic and pre-bariatric surgery clinics). The vast array of subspecialist services dealing with childhood obesity there were second to none. Similar coordinated services are currently not available in the UK apart from some provision within UK based paediatric bariatric services, which are limited in availability and primarily focused on surgery and not medical management of children with the problem. Hence, this too was felt to be an ideal service to conduct the fellowship at.

Two weeks were spent at each centre meeting teams, observing how their services were run and analysing interventions and tools that were used by these services.

Areas of observations that were focussed on were:

1. Method of service delivery and service models within the hospitals and clinics.
2. Dietary strategies and lifestyle modification techniques.
3. Similarities and differences with UK based practice to improve patient management within the UK.

A further aim was to analyse strategies developed by the Amsterdam group to identify key approaches that have led to a successful strategy in a city with a similar population demographic to Manchester and London.

Findings:

Service Specifications

Service commonalities found in both weight management services (the OWL service run by BCH and the Healthworks! service run by CCH) were seen in the provision of multidisciplinary (MDT) team services at all consultations. Essential components at every consultation were the provision of:

1. Paediatrician / paediatric endocrinologist with a weight management interest - for medical assessment of all patients.
2. Psychologist – for assessment of underlying causes for weight issues and teasing out reasons for non-compliance with weight loss strategies and motivation.
3. Nutritionist – to provide a targeted assessment and dietary plan for patients.

Additional optional provision was available for:

4. A social worker or equivalent – to help identify sources for particular needs especially in families affected by deprivation or difficult social circumstances.
5. An exercise physiologist or physical therapist – to provide a clear planned target for increased physical activity for patients.

Each new patient was seen by every member of the team for approximately half an hour to an hour, ensuring a detailed interrogation of the family's physical, mental, dietary, activity and social circumstances, to ensure a robust plan of intervention and teaching could be put into action to bring about successful lifestyle change.

Similar services in the UK would be classed as Tier 3 obesity services. These services with complete MDT teams (outside bariatric centres) are not only sparse in adult medicine in the UK, they are virtually non-existent in the world of paediatric medicine. There is no formalised and compulsory commissioning process for such services and hence the development of such services is directly

dependent on local medical commissioners' priorities for funding. Provision of such services is therefore akin to a postcode lottery across the British Isles.

Regular Patient Contact

Compared to standard NHS services for obesity in the UK, follow up for patients was significantly more frequent. All patients were followed up at regular intervals of no more than 3 months (compared to 6 months in the NHS), with most initial follow up appointments about 4 weeks apart until clinicians felt progress was being made with education and lifestyle changes. These follow up appointments were not necessarily with the entire MDT team but more so with the nutritionist and psychologist depending on need, once medical assessments were completed.

At BCH services were centralised to the main hospital without the option of satellite clinics, and therefore other ways of facilitating appointments were being trialled so that appointment frequency was not onerous for families. More local individual appointments were being piloted using telemedicine with face-to-face video conference calls to reduce inconvenience for patients in terms of school interruption and travel whilst facilitating regular follow up.

At CCH, 11 satellite MDT clinics up to 2 hours' drive away, including 3 located at local schools were available in order to facilitate more local follow up to ensure patients were seen regularly.

Dedicated complex services and increased bariatric interventions

The range of obesity clinics at both BCH and CCH also surpassed what is offered in the UK quite comprehensively.

In addition to regular weight management services, services were also designed to be age friendly with dedicated clinics for younger patients (< 5 years), in between ages and the older teen/adolescent specific clinics. This pooling of patient ages was particularly useful to address specific differences in the groups. For example, the younger patients (< 5 years) were more likely to have a genetic cause of obesity when compared to older patients and therefore may have required a slightly different assessment such as for learning delay. Dedicated clinics for older teens and adolescents required different approaches and were more likely to require psychology input to deal with the psychosocial aspects of obesity. This older cohort was also considered for triage to bariatric services.

Dedicated clinics were also set up for patients with non-alcoholic fatty liver disease (NAFLD) and non-alcoholic steatohepatitis (NASH) to include a gastroenterologist / hepatologist for the assessment of liver function, and for patients with cardiovascular complications of obesity with a cardiologist present.

Lastly, bariatric clinics particularly for those who were morbidly obese (BMI>35kg/m²) were run regularly at both BCH and CCH. I observed more referral to bariatric clinics than in the UK, for assessment in those patients with morbid obesity, those who were pre-diabetic or those who were keen to explore surgery due to mobility issues or because another member of the family previously had similar surgery.

The American Society for Metabolic and Bariatric Surgery Paediatric Committee (ASMBS) most recently published bariatric surgery guidelines in 2018. This guidance advocates for much earlier referral of adolescent patients (defined as ages 10-19 years as per WHO criteria) into bariatric services than is currently the norm in the US (or indeed the UK). They recommend that morbidly obese adolescents with a BMI in excess of 20% above the 95th centile, those with an obesity-related co-morbidity, or adolescents with a BMI in excess of 40% of the 95th centile should all be considered

for metabolic bariatric surgery (MBS). They also stipulate that adolescents with learning disabilities, mental health issues, eating disorders such as binge eating that are treated, immature bone growth, or earlier pubertal status (lower Tanner staging) should not be denied surgery. The justification for this is that obese adolescents are likely to become obese adults and the MBS could lower the risk of co-morbidities such as psychosocial issues and low quality of life (QoL), Type 2 Diabetes, sleep apnoea and NASH.(24)

In the UK, paediatric bariatric surgery is not only rare, this is usually only carried out in individuals who are aged 16 years and above. At present, there are only 4 centres for paediatric bariatric surgery in the UK, 3 of which are located in the southern half of the country. Referrals to these services require a patient to have first failed interventions and medical treatment in Tier 3 obesity services. However, as mentioned previously, Tier 3 services and access to these themselves are limited. In addition, individual patient application for funding for a bariatric procedure has to then be instigated before surgery can proceed within the NHS.

I think the UK is probably still right to be cautious about the use of bariatric surgery in younger adolescents. Nevertheless, we need to change healthcare attitudes toward bariatric surgery in later adolescence, seeing it as a form of treatment for those whose co-morbidities outweigh the cost and risks of surgery. In truth, the risks of more definitive bariatric surgery are small or equivalent to other surgical procedures especially when done laparoscopically, provided longer term monitoring is undertaken for nutritional deficiencies. The Teen-labs study found that adolescents lost an almost equivalent amount of weight to adults undergoing bariatric surgery. Their regression of pre-diabetes and diabetes was more effective as was the case for raised blood pressure, with most not requiring any medication for these co-morbidities post bariatric surgery. Nevertheless, they were less likely to take their nutritional supplements in the longer-term and were more likely to need abdominal surgery particularly gall bladder surgery 5 years on from MBS.(25,26)

Weight loss was in the region of 25-30% after definitive MBS procedures (sleeve gastrectomy or Roux-en-Y gastric bypass), with weight regain of approximately 3% at 3 years and 5% at 5 years.(27,28)

Funding Streams

There are significant differences between the funding of healthcare services in the UK and the US. In the UK, there is phenomenal provision of free healthcare services at point of care for anyone who is resident in the UK with legal immigration status and, at present, European nationals through agreements with the European Union (EU). The National Health Service (NHS) which is the main provider for healthcare in the UK is essentially funded through government use of centralised funding derived from taxation. Fixed tariffs are set for conditions to ensure equal billing across all healthcare services that sit within the NHS. Nevertheless, there is minimal remuneration for complex services which require MDT provision or more frequent patient contact. MDT clinics are financed through a fixed minimal additional charging code despite the total cost of providing these services being far more than that provided. Charges are also significantly less for facilities run through phone or telemedicine, unwittingly de-incentivising both full MDT provision of services and telemedicine services in the UK.

My initial hypothesis when travelling to the US was based on the flawed presumption that patients seen in obesity services were completely self-funded for their healthcare and therefore would be highly motivated, leading to the assumption that clinic attendances would be significantly higher than in the UK. This assumption could not have been further from the truth. Most patients seen in these services were funded through state health insurance due to deprived social circumstances.

In the US healthcare system, service provision is funded through recouping payment from healthcare insurers or state health insurance schemes. Therefore, provision of MDT services is billed according to actual cost incurred, however each patient may be limited to the amount their insurance policy will cover and therefore provision of psychology services has to be justified through demonstration that the patient has a required need. Also the array of diagnostic investigations may, in some cases, be limited by funding particularly in the case of genetic testing. Nevertheless, as the patient themselves may not be directly paying for these provisions, outcomes in both UK and US populations in terms of clinic attendance and adherence to treatment programmes appear to be similar despite my initial thoughts on the matter.

One fundamental difference in American healthcare is the acceptance of external gifts and charitable funding within health services, which is an alien concept to the NHS as this may be perceived as biasing medical professionals and patients toward donors.

At BCH, a substantial portion of the obesity clinic facility, soft healthcare provision such as information leaflets, and community OWL physical activity programmes have been funded by New Balance Foundation (footwear company), making sustainability of these less profitable complex services, financially viable.

At CCH, the 'Healthworks!' family-based obesity programme receives significant charitable contributions from Ethicon, a subsidiary of Johnson&Johnson, which enables the community arm of services to be financially viable. In addition, working in partnership with stakeholders such as the Kroger Company, a large scale supermarket store chain has made healthy food purchasing advice available for those in need of it. These stakeholder initiatives, working independently but in partnership with healthcare, make a significant difference to ensuring consistency of messaging across Cincinnati.

The use of Positive Terminology and thoughts on communication

Obesity is a highly stigmatized condition. Advertising, the fashion industry and the general public tend to prefer certain body shapes and builds which can add to the negativity around this matter. Health professionals can also respond negatively to overweight persons, which can negatively affect treatment. Weight stigma can also lead affected individuals to internalize such experiences which decrease their overall quality of life. Sources of stigma may come from peers, family, educators, media, as well as healthcare professionals (29,30). Individuals, particularly children, with stigmatized experiences (weight – related teasing and bullying) have increased risks of adverse health outcomes which include physical, behavioural and psychological sequelae.

The use of positive terminology at BCH and CCH was notable from the service names used to identify their services namely Optimal Wellness for Life (OWL) services and Healthworks! respectively. In addition, approaches to management looked to empower individuals to make changes to lifestyle through motivational interviewing techniques such that the patient was able to feel in control of the decision making process.

Changing terminology (for example from obesity services to healthy weight optimisation, and weight management to healthy lifestyle management) can have subtle effects on how health management is perceived and received.

According to Gollust, communication about the social determinants of health needs to address at least three audiences, namely the general public, the medical and public health workforce, and decision makers in the public and private sectors. There are at least two types of target audiences amongst the public, those inclined to agree with messages about social determinants of health and

those inclined to disagree. Communication about the impact of social determinants should seek to encourage the former group and persuade and shift opinion amongst the latter.(31)

Gollust also listed three lessons about the effectiveness of various strategies to communicate about population health. First, communication designed to only increase the awareness of social determinants may not be enough to bring about change. Second, to influence public opinion and government policy, communication needs to reflect important values in society that resonate with large audiences. Third, when developing communication strategy, it is important to recognize and address challenges from groups opposed to the population health messages. Therefore, population health messages that reflect important societal values can be the most persuasive, and using personal narratives to convey information about the determinants of health can lead people to focus more on the role of personal responsibility.(32)

Current Areas of Need and Gaps in Obesity related services in the UK

A lack of recognition for required funded services to help children and adolescents who are already severely obese

There is currently a chronic lack of adequate services in primary and secondary care across the UK to deal with unhealthy weight in children and adolescents. The perception by those able to deploy funding to deal with this crisis appears to be that prevention alone is the solution to the matter. There is a lack of recognition that there are already over 22,000 10-11-year-old and close to 15,000 4-5-year-old children who are severely obese in England and Wales, as published by the Local Government Association (LGA) report in May 2018 based on current NCMP data at the time. These are children who are likely to have obesity related comorbidities that will require medical assessment and treatment. Yet there appears to be little attempt by Public Health England or the Department of Health to adequately fund paediatric and adolescent services to tackle this issue at the time of writing this report.

Barriers to engaging with obesity across the board

McGowan, described several barriers to clinicians or patients successfully engaging with obesity which include:(33)

1. Obesity not being recognised by some as a disease - resulting in either healthcare professionals feeling it is not something they should tackle as they do not think that it is a healthcare issue, or patients not presenting to their clinician because they fail to recognise they have a problem with unhealthy weight.
2. Frustration about the inability to successfully manage the problem or achieve weight loss – which may result in patients being disillusioned with medical help or HCPs feeling they lack the tools or effective treatments to deal with the problem, in turn leading to reluctance to deal with the issue. In addition, HCPs perceive a lack of attendance by patients at follow up sessions to be a significant problem in paediatric obesity treatment.(34)
3. Anxiety about starting the conversation – oftentimes patients may present for a separate medical issue and there is reluctance by clinicians to then address the glaringly obvious issue of unhealthy weight. Anxiety may stem from the lack of consultation time that may be available to start the conversation in busy primary or even secondary care practice, with further inertia stemming from a fear that broaching the subject may be perceived by the patients as being insensitive or irrelevant and hence may compromise the clinician-patient relationship.
4. Lack of training and available resources – although many HCP associate bodies advocate that appropriate training in obesity management is important, there is a distinct lack of training packages. There is also a paucity of multidisciplinary services in the UK that can also provide practical training in the field. The chronic underfunding and underinvestment of specialist obesity services of children and adolescents, and the lack of provision of uniform comprehensive resources for the management of unhealthy weight are two of the fundamental problems underpinning this issue.

An unfilled need for training of HCPs in the field



*Amanda Rauf, Psychologist; Steven Coletti, Team resource Specialist and Leslie Mattimore, Dietician
(Members of the OWL Weight Management Team at BCH)*

There is currently an unfilled need for training of healthcare providers to tackle unhealthy weight in children and adolescents. Resources are currently limited. This is an issue that has previously been identified not just in the UK but in the US as well.(35,36)

Most training available is currently focussed on managing Type 2 diabetes in relation to obesity with little training specific to obesity itself. Some of the training programmes currently available are:

In the UK, **The Introductory Certificate in Obesity, Malnutrition and Health** produced by the Royal College of General Practitioners (RCGP) Learning group as part of their metabolic problems component. This is an e-learning course which also includes a behaviour-change study day and can be found at <http://elearning.rcgp.org.uk>. Nevertheless, this requires registration with the RCGP.

Internationally, **The Specialist Certification of Obesity Professional Education' (SCOPE)** which provides an internationally recognised training and accreditation. This is an e-learning core learning path that consists of an 8 module course and aims to give the HCP an understanding of the causes of obesity, the complications of obesity, how to raise the issue with patients, how to undertake a history and examination, how to develop a weight loss plan and address obesity in children and adolescents, together with additional supplementary modules. This is part funded by NovoNordisk and the EU. This can be found online at www.worldobesity.org/scope

Psychology training gap

An essential component to a multidisciplinary weight management service is the provision of psychology services. This is in recognition of the behavioural aspect of eating and the fact that patterns are closely linked to emotional well-being, social perceptions of surroundings and circumstances. Eating is also a habitual behaviour and disordered eating patterns can be due to addiction. Therefore the ability to address this successfully, and in some to bring change to habitual behaviours, requires psychological intervention.

Formal psychiatric and psychology training for dealing with eating disorders in the underweight is well established in the UK. However, specific psychology training for HCPs for the overweight spectrum of disorders is sparse. This is a gap that needs addressing but it is unclear with whom the responsibility lies in establishing training in this area, given that funding for such services is almost non-existent in the UK.

Factors to consider when conducting a successful obesity consultation

Correctly assessing a new patient with unhealthy weight and ensuring that a number of key issues are approached could significantly affect their success outcomes with weight loss. At present, there are no ideal templates or training schemes for teaching clinicians on how to assess obesity in the community, primary care and in hospital services.

Communication

Communication by healthcare professionals (HCPs) with patients about obesity needs to respond to the complex psychosocial and biological processes which affect weight and health. Communication that thoroughly addresses root causality and personal barriers to change, whilst empowering patients to take action to improve their health is poorly understood. The collaborative-deliberation model is therefore thought to be a good model for approaching cases dealing with unhealthy weight as it uses interpersonal working that is underpinned by empathic communication and shared decision-making which are two key components required particularly when engaging teenagers.

Luig T et al analysed consultations in obesity and initially found eight key components that helped patients to make changes to improve health, namely:

1. Demonstrating compassion and active listening
2. Making sense of root causes and causality factors in the patient's story
3. Recognizing positive strengths
4. Addressing misconceptions about obesity
5. Focusing on a holistic or whole-person health
6. Putting together a clear action plan
7. Encouraging reflection on discussions and
8. Experimenting with change.

He and his group also further identified five processes that may be important for using the collaborative-deliberation model when approaching obesity, distilled from the original model, namely: 1. Exploring the story, 2. Reframing the story, 3. Co-constructing a new story, 4. Choosing a priority, and 5. Experimenting with alternatives.(37,38)

The HELP trial found that in 174 adolescents with obesity, those that received 12 one-to-one sessions over 6 months did not see a significantly improved quality of life when compared to controls who received 1 single one-to-one weight management advice session in. Hence, success with interventions may not necessarily lie in the frequency of the sessions but rather in what the sessions deliver and possibly what happens to the individual outside of those sessions.(39)

Several key concepts are stressed across the board when addressing the topic of unhealthy weight with patients. Both BCH and CCH used a **multidisciplinary team** to address **multicomponent interventions** which include dietary advice and interventions to improve eating behaviours, quality of diet and to reduce overall energy intake; psychological and behavioural change strategies including cognitive behavioural therapy (CBT); physical activity interventions to decrease inactivity and increase energy expenditure; and pharmacotherapy.(40–42)

Motivational interviewing (MI) which promotes engagement of the patient in taking responsibility of their own management and goal-setting was also a common technique observed by all HCPs involved in the MDTs at BCH and CCH. Although this is not a magic solution to the successful consultation, MI has been demonstrated to show modest weight reduction success.(43,44)

Childhood obesity poses some unique **issues that lead to differing management from adults**. Firstly, children often cannot control the food provision given to them. They are dependent upon their providers (guardians / parents / carers) for food provision. In addition, they are also dependent upon their carers to facilitate physical activity for them.

Secondly, children are also more likely to have less developed brain functioning when it comes to exercising will-power and decision-making processes, particularly in adolescent years. Evidence suggests that there is a dissociation between impulse control and response inhibition during adolescence, with adolescents being more responsive to immediate rewards. Decision-making in adolescence may be more highly affected by emotion and social factors. At the age of 12 years, children have been demonstrated to have the capacity for competent decision-making. However, this age coincides with the onset of adolescence when there is development of the brain's reward system combined with late development of the control systems. This therefore diminishes decision-making competence in adolescents in specific contexts such as food choices, making the influence of facilitating environmental factors, such as family support mechanisms, essential for successful decision-making.(45,46)

A study of over 300 Swedish adolescents undergoing obesity management also found that factoring in parental styles was essential to successful weight management, and approaches needed to be individualised to their parenting approaches.(47) Therefore addressing and using successful **family-based approaches with good parenting skills** is strongly advocated particularly in paediatric and adolescent consultation.

Success with obesity management is also dependent to some degree on continued engagement with services. A common feature seen in most clinics which can lead to clinician frustration is non-attendance. This usually leads to follow-up attrition or drop out from clinics. Non-attendance rates observed at BCH and CCH were similar to that seen in the UK. Interview studies with parents and children seen in obesity services in the US found that despite positive experiences and very limited dissatisfaction with services, attrition occurred due to a number of common themes identified through questioning which included:

1. Juggling demands on time commitments
2. Travel distance from clinics
3. Impact of missed schooling time
4. The stress of attendance
5. The lack of dedicated adolescent services.

Therefore, it is essential that HCPs develop secure relationships with families, help children and families have realistic expectations of outcomes from engaging with services, and determine families' value systems on treatments and interventions offered.(34,48–50)

Assessing motivation

Motivation is the impetus that provides an individual with a reason or reasons for acting or behaving in a particular way. Motivational Interviewing (MI) is a method for encouraging people to make behavioural changes to improve health outcomes. It is often used to address addiction and the management of certain chronic health conditions such as diabetes, heart disease, and asthma. This intervention helps people become motivated to change particular behaviours or habits that are preventing them from making healthier choices. The techniques were founded by William Miller and Stephen Rollnick and consist of 4 processes which are based around the principles of self-determination theory and collaborative decision making which are individualised and person-centred to bring about change.(51) These principles include:

1. **Engaging:** Clinician / patient engagement through showing or expressing empathy, acceptance, and a positive focus on a person's strengths. Engagement also involves four patient-centred skills which are summarised in the acronym OARS: a) asking open questions,

- b) affirming patients' strengths, c) reflecting to patients what they are expressing, both spoken and unspoken and d) summarizing what has occurred in the interaction.
2. **Focussing:** This is about helping the patient identify and determine what is truly important to them and using that information to set the foundations for the work. It involves encouraging the patient to do the work of identifying his or her own areas or issues that are leading to the undesirable behaviour, ambivalence or struggle, and resistance to change. This is followed by goal-setting where goals are mutually agreed upon by both parties.
 3. **Evoking:** This involves discovering the individual's level of personal interest in and motivation to change. Things a patient says may make it clear whether or not they are open, willing or ready to change. Open-ended questions are a useful tool in exploring this and asking patients to share examples in their responses to your open-ended questions about change is another good way to gather information and encourage 'change-talk' which will help deal with resistance to change.
 4. **Planning change:** The important thing about the planning process in motivational interviewing is that the plan comes from the clients. The process is geared toward supporting self-efficacy, developing autonomy and personal empowerment for successful change because it is ultimately self-driven.

Components of the Consultation - Enquiry

In the vast majority of cases, the cause of obesity is an energy mismatch resulting in an excess of energy being consumed for the energy expenditure an adult or child experiences. This results in an overall net positive balance of energy which is measured in kilocalories (kcal) and stored as fat.

Using caloric calculations as the overriding principle for reducing caloric intake through dietary changes and increasing caloric burn through physical activity makes setting and achieving a target more measurable and easier to assess.

The consultation will require didactic questioning in part, but also with room for using motivational interviewing techniques to help patients and their families identify areas where they feel they need to make change (barriers to change) and then agreeing changes they feel they can realistically work on until the next review.

The enquiry rationale developed below was developed from observing interviews with paediatricians, dieticians and psychologists at BCH in particular and also analysing some of their questionnaire tools that they used. This was then further refined through observations at Healthworks! clinics in Cincinnati to ensure the final questionnaire developed was thorough and usable within my own local service at the Royal Manchester Children's Hospital (RMCH). See appendix 1.

Dietary Intake questions

Interrogating a person's diet and their dietary habits to elucidate any issues that might be contributing to their net gain in energy is essential. The following are a list of questions that must be included when enquiring about this.

Questioning someone about their dietary habits can cause angst and seem like an intrusive interrogation. Therefore, framing this in a realistic daily framework can ease the approach by enquiring about this in the context of a 'walk through a normal day'.

Dietary walk through the day	
Breakfast	

Lunch	School dinner / packed lunch
Dinner	
Snacks (crisps, chocolate)	
Puddings / sweets	
Drinks: How much liquid/day Sugary drinks / juice Dairy (type of milk, yoghurt)	
Fast food (no./week) Take away (no./week)	
Fruit and veg (servings per day)	
Estimated caloric intake per day	

Establishing eating patterns, how these interact with the social functioning of the family and elicit how best to tackle dietary habits is also key to developing a successful strategy for change. Hence making enquiry into a number of aspects around attitudes to food is therefore also essential.

Dietary history: Does the family eat together? (days per week) Does the family eat at the table? Are meals eaten in front of the TV? Is it a food safe home?		Who cooks meals (childcare / split family)? Are meals cooked from basic ingredients? Cooking Methods (Fry / Bake / Boil) Time without food (Time limited eating < or > 12 hours) Is there satiety?
Type of eater and habits: Picky, binger, grazer Fast / slow Meal skipper / snacker Food aversive behaviours (autism)		
Mood eating		
Boredom eating		
Snacks in the room or eating during screentime?		
Covert eating – sneaking food		
Food engagement – cooking, food shopping		
Barriers to change		

In developing any dietary change plan for an individual, 4 key principles need to be considered. These are:

1. Changes must be achievable
2. Changes must be affordable
3. Changes must be inclusive – therefore these must run across the family which is a key tenet of developing a food safe home
4. Changes must be sustainable – changes that are for the longer term to reduce weight regain

Exercise Expenditure Questions

Finding out how often and how effectively a person burns off energy in the form of activity and exercise is also paramount to determining factors that might be contributing to their net gain in energy. Nevertheless, one of the barriers to physical activity in modern times is the commitment to screentime, be that for the purposes of gaming, social interaction or school work. In addition, motivation to support physical activity varies between individuals. Group interaction, competition, and external facilities can either promote or demotivate individuals according to personal preferences. Dance inspired exercise routines might motivate teenage girls more than boys, group activities might prove intimidating to the less able or the physique-conscious individual; whilst for the disabled, non-weight bearing activities or ones that require less coordination might be required. Tailoring advice to individual need is key to successful change. Also recruiting family or buddy support for such activities encourages accountability and longer term motivation. The following are essential questions that might help establish the best approaches.

Physical activity and hobbies :	
Hours and type of Sporting activities No. Days with 1 hr exercise/week No of sessions of PE at school	
Hours of screentime (TV, gaming, computer, phone) weekday weekend	
Other activities (walking pet) Hours studying	
Rough calories burnt a day	
Exercise preferences: Preference for group sport or exercise in isolation	
Likes competitive activities	Y/N
Likes measurable activities	Y/N
Ability to swim / cycle?	Y/N
Exercise buddies / family exercise	Y/N
Local facilities (pool, gym, park) / park run / YouTube videos	
Mode of travel to school	
Barriers to exercise:	

Psychology questions

Apart from motivation, issues that come under the umbrella of psychological well-being are also an essential part of your enquiry to establish a person's motivation and outlook on their body shape, will-power and lifestyle. This enquiry may also identify insidious issues that may be contributing to a person being overweight such as chaotic lifestyles and deprivation.

Disordered eating, particularly binge eating disorders (BED) in particular have been shown to be associated with childhood maltreatment experience. Emotional abuse has been associated with greater body dissatisfaction, depression and lower self-esteem in both males and females. Sexual abuse in particular is associated with greater body dissatisfaction in males. HCPs therefore should be fully aware and clued onto the association between BED related obesity in particular with dissociative symptoms and childhood traumatic experiences.(52–56)

Psychological assessment:	
Schooling Name of school: Year: School performance: Absences:	
Stressors – school, learning challenges, home	
Emotional health assessment:	
Method of dealing with sadness, anxiety, depression, stress	
Evidence of emotional eating?	
Family history of depression	
Relaxation activities as a family	
Hobbies	
Screentime (4 things to do before – homework, house chores, exercise, conversation)	
Family involvement (family buy in for change)	
Is there evidence for binge eating?	
Is there a history of abuse (domestic, sexual)?	

As part of the psychological assessment, enquiry into sleep patterns is also essential as this can affect behaviour and overall mental health. Poor sleep is related to an increased risk of overweight and obesity in adolescence, although exact mechanisms are not entirely clear. Some of this may be associated with disruption of circadian rhythms and increased snacking in the night.(57,58) Poor sleep also increases sedentary behaviour through the need for napping and lethargy, which limits overall energy expenditure.(19) Studies have also demonstrated that daytime sleepiness is associated with higher average blood glucose levels.(59) Therefore elucidating sleep behaviours is important as part of the enquiring process.

Sleep: Duration - How many hours per night (min 8-10hrs)? Sleep time and wake time? Are there tech devices in the room? Y/N Quality of sleep (falls asleep easily, wakes in the night) No. of naps during the day	
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Components of the Consultation - Advice and targets for healthy weight success

Dietary advice – the role of sugar



Low Glycaemic Index (GI) diets

Both BCH and CCH advocate the use of low glycaemic index (GI) diets. Glycaemic Response (GR) is the blood sugar (glucose) response rise that occurs after food is consumed containing sugar in the form of carbohydrates. The amount of carbohydrate and how quickly this is metabolised varies between foods.

The low GI diet is currently not a diet that is used regularly or recommended in the childhood obesity setting but is more utilised in the context of diabetes management. However, as this form of dietary advice was being encouraged at both centres and has a strong evidence base for reducing obesity-related comorbidities particularly in adults, I chose to investigate this further after interviews with dietitians particularly at BCH and have distilled some of the evidence and information regarding this below.

What is Glycaemic Index?

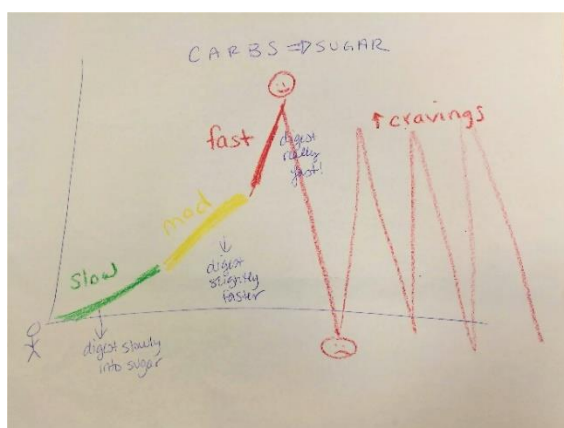


Diagram by Leslie Mattimore to explain the GI concept to patients at BCH.

Glycaemic index (GI) is the GR elicited by a portion of food containing 50g (or in some cases 25g) of available carbohydrate and is expressed as a percentage of the GR elicited by 50g (or 25g) of the reference carbohydrate. The GI index runs from 0 to 100 and usually uses pure glucose, which has a GI of around 100, as the reference.

Foods containing carbohydrates that are digested, absorbed and metabolised more quickly are considered high GI foods (GI > 70 on the glucose scale). Slowly absorbed carbohydrates that are processed by the body more slowly and take longer to break down, are considered low GI foods and have a low GI rating (GI < 55 on the glucose scale). These include most fruits and vegetables, unsweetened milk, nuts, pulses, some wholegrain cereals and bread. (60)

Therefore, the higher the GI, the more quickly the food generates a rise in blood sugar or GR. Hence, lower GI foods cause slower rises in blood sugars and are weaker drivers for insulin production, which is the hormone that aims to reduce blood sugar but also has other effects such as driving hunger responses.

Things that can alter GI ratings

Cooking methods such as frying, boiling or baking can alter GI values. Processing foods can also do so for example rolled oats have a higher GI than steel cut quick-cook oats. The ripeness of a fruit can also increase GI. Fibre-rich foods such as those containing wholegrains have a lower GI because they act as a physical barrier that slows down the absorption of carbohydrate. This is not the same as 'wholemeal', where, even though the whole of the grain is included, it has been ground up instead of left whole, making it easier to digest. Therefore, some mixed grain breads that contain wholegrains have a lower GI than wholemeal bread. Wholemeal bread however will still have a lower GI than white bread. Fat and protein also lower GI in a mixed meal.

Why is Glycaemic Index (GI) important and how is it linked to disease?

Since the first publication about GI by Jenkins DL et al, in 1981, there has been a growing body of evidence indicating the importance of GI in diabetes, cardiovascular disease (CVD), cancer and body weight management.(61,62) Calculating exact GR and GI values of mixed foods can be challenging as this is dependent on the amount of fat, protein and fibre in the food that all affect rates of carbohydrate absorption. Nevertheless, large epidemiological investigations have shown that the combination of low GI and high cereal fibre intake reduced T2DM risk by 2-fold in men and more so in women.(63,64) Low GI diets are therefore felt to confer reduced CVD risk particularly in insulin resistance and diabetes and offer the prospect of reducing chronic disease and its complications.

The mechanisms for CVD and diabetes risk are now thought to be understood. Eating is followed by the production of a surge of a metabolite called AcetylCoA, which combines with oxygen to produce energy molecules (ATP) and free radicals. Excessive production of these free radicals, when too much food is consumed, is thought to cause a state of stress for cells (oxidative stress) which drives resistance to the hormone insulin, CVD and diabetes.(65,66) Systematic reviews and meta-analyses also indicate that the higher dietary GI is directly associated with breast and colorectal cancer risk (with a pooled relative risk of 1.1-1.2). (67,68). Larger blood glucose fluctuations between unfed and fed states generate greater oxidative stress; even more than just chronically high sugars.(69,70) Therefore eating lower GI foods that do not fluctuate blood sugars significantly is thought to be healthier and linked with reduced morbidity.

However, the science behind GI can be complex and if one is pedantic, then using the GI method precisely enough to distinguish between high GI (GI>70) and low GI (GI<55, Glucose scale) may prove

to be extremely tricky. This is because calculating GI in mixed meal foods (those containing different food groups) is subjective whilst how the food is processed or cooked can also vary the value.

Traditional societies consumed largely unprocessed plant based diets that were high in fibre and included whole grains, legumes and nuts as staples. These diets were low GI. The low GI concept is an extension of the 'fibre hypothesis' which suggests that fibre reduces the rate of nutrient absorption from the gut.

Legumes and whole grains are a good source of low GI carbohydrate and fibre, making them a valuable means for lowering the glycaemic-index of the diet. Nuts have a healthy nutrient profile, with high mono- and polyunsaturated fatty acids, vegetable protein and fibre and low in carbohydrate content, making them a useful way to lower the GI of a meal as well. Therefore, as part of encouraging a low GI diet, nut and whole grain containing foods are advocated as they may reduce diabetes risk.(71,72) Replacing refined starches (e.g. processed grains and potatoes) with whole grains, also incorporates the benefits of higher amounts of fibre, minerals and vitamins into the diet. Foods containing refined starches such as white breads, sometimes referred to as 'beige foods', should be avoided.

Simple suggestions for including low GI foods in the everyday diet may include:

- Swapping certain rice grains from starchier versions like Arborio or jasmine rice for those that are less starchy like wild rice, brown rice or basmati.
- Using lower starch grains such as bulgur wheat or protein rich quinoa.
- Choose wholemeal breads, rotis or pitta breads.
- Consider wholegrain breads such as granary or multigrain breads, pumpernickel or rye bread.
- Try porridge made from rolled oats, natural muesli or wholegrain breakfast cereals.
- Choose new potatoes or fibre-containing sweet potatoes over old potatoes

Lower GI is thought to have an effect on obesity through its effect on food consumption and hunger. The effects of high GI foods in driving up blood insulin levels and eventual resistance to insulin are thought to induce hunger and overeating. High GI diets are therefore proposed to promote excessive weight gain. Ludwig et al (73,74), reported greater hunger and food intake with a high GI diet, whilst Ball et al,(75) reported increased feeling of fullness (satiety) after a low GI diet by up to 48 minutes longer when compared to a higher GI meal. Although adult studies clearly demonstrate successful weight loss from using low GI diets, the evidence is not conclusive in children and adolescents. This however might be due to the lack of available studies conducted in this age group rather than concrete data demonstrating findings that counter the benefits of low GI in children.

Nevertheless, the physiology behind encouraging low GI diets is compelling and logically extends from adult care into childhood.

Does low GI alone sort the problem?

Not all low-GI foods are healthy choices – most chocolates, for example, have a low-GI because they contain a substantial portion of fat which slows down the absorption of carbohydrate. A balanced diet is therefore essential. Focussing on the GI of foods alone could still lead to an unbalanced diet that is high in fat and calories, which could in turn lead to weight gain (making it harder to control your blood glucose levels) and increase your CVD.

The total amount of carbohydrates you eat has a bigger effect on blood glucose levels than GI alone. Although a bowl of pasta may have a lower GI than watermelon, it will contain more grams of

carbohydrate than an equal volume of watermelon. Therefore, if you eat similar amounts of these two foods, although the pasta may have a lower GI its overall carbohydrate content is higher and therefore it will have a greater impact on your blood glucose levels after eating. Therefore, portion control of low GI foods is still essential.

Low GI diets however do not equate to low carbohydrate diets. Low carbohydrate diets are popular for the purpose of quick weight loss.(76) Low carbohydrate diets (defined as a carbohydrate intake <60g/day) on meta-analyses do demonstrate greater weight loss at 6 months but not in the longer term (12 months). Mean differences in weight using low carbohydrate diets with or without a ketogenic component (higher fat) in the longer term were only approximately 0.91-1.15kg.(77,78) Also comparisons of low carbohydrate / high fat and high carbohydrate / low fat diets found that the latter had only small but significant reductions in weight of a mere 16g/day.(79) These analyses therefore suggest that there are no real benefits in differentiating food- group specific diets and that changes in weight are probably more down to energy or caloric intake.(80)

Fat facts

Astrup et al., in a review of 4 meta-analyses on dietary fat reduction and weight change found that low-fat dietary intervention trials consistently demonstrate a significant weight loss of 3-4 kg in normo-weight and overweight patients. The loss noted had a positive relationship between percentage fat reduction and weight loss. A 10 % reduction in dietary fat is predicted to produce a 4-5 kg weight loss in an individual with a BMI of 30 kg/m².(81) So without a doubt, reducing fat content of a meal is essential to weight loss. Nevertheless, another meta-analysis of six intervention trials showed no significant differences between low-fat diets (20 to 30 g/d or 20% of total energy) vs other weight-loss diets in terms of longer-term sustained weight loss.(82) A further study by found that in low fat dietary interventions, those containing a higher proportion of fat (groups differing by >5% fat content) led to slightly greater weight loss and better adherence, although the magnitude of the differences in weight loss were small.(78) The important message is that long-term adherence and sustainability of a dietary intervention rather than a specific diet is the most important ingredient in success.

Protein Facts

Having more protein in a diet will also lower the GI index of a meal. Higher dietary protein can have positive effects for healthy weight as it promotes reduced hunger, increased energy expenditure, and it changes body-composition in favour of fat-free body mass when compared to carbohydrate. This is particularly helpful when caloric restriction is being considered in the form of a weight loss diet. High protein-low carbohydrate diets may also have positive benefits in reducing liver triglyceride levels.(83) An intervention study by Astrup et al, has shown that a low-fat diet where carbohydrate was replaced by protein produced more weight loss after 6 months (8.1 v. 5.9 kg).(81) In addition, a small study by Mikkelsen demonstrated that substitution of carbohydrate with 17-18% of calories in a meal as either meat or vegetable protein produced a 3% higher 24-h energy expenditure, meaning more calories ultimately get burnt off by the body with a higher protein diet. Animal protein in turn produced a 2% higher 24-h energy expenditure than vegetable protein.(84) A study by Claessens compared the effect of low-fat, high-carbohydrate (HC) against low-fat, high protein (HP) diets on weight maintenance after weight loss induced by a very low-calorie diet. It was found that the HP diet group showed significantly better weight maintenance after weight loss (2.3 kg difference), with no significant negative effects on metabolic and cardiovascular risk factors in healthy obese subjects.(85) Therefore, diets with lower fat, lower carbohydrate and higher protein overall produce better weight loss, weight maintenance and metabolic caloric burn.

In summary, although fat lowers the GI index of a meal, it is preferable to raise the protein content and reduce the carbohydrate content of a meal to achieve a lower GI diet as this has better weight reduction and is more sustainable. This coupled with the general principles of the low GI diet such as increasing fibre and whole grains is not only more achievable as a dietary intervention than a low-carbohydrate diet but is more easily sustainable in the longer term.

The effect of genes on standard interventions with weight and diet

Genetic variation can also influence weight loss through its effect on basal metabolic rates and responsiveness to certain diets. The Preventing Overweight Using Novel Dietary Strategies (POUNDS Lost) study demonstrated that individuals with the fat mass and obesity-associated (*FTO*) gene had greater weight loss with diets specifically high in protein although further meta-analyses suggest that those with the gene should respond to lifestyle interventions and diets with weight loss.(86,87) The Diabetes Prevention Program found that certain genes may affect weight regain rates, predisposing some patients to faster or slower weight regain, although the significance of these genes is not fully conclusive.(88,89)

Calorie Content and Counting

Obesity stems in the large majority of cases from an energy imbalance with energy intake exceeding energy expenditure in an individual. Therefore, the underpinning principle of all dietary approaches to achieve weight loss is that energy balance must be negative. Energy balance can be calculated by using a measurable form such as calories, which are a measure of the energy value of food and drink. Traditionally food used to be measured in kilojoules of energy but calories are now the preferred measure for food products with 1 kilocalorie equating to 4.2kilojoules.

Different foods groups have different energy densities. Fat is more than twice as energy dense as carbohydrate and protein (1g fat = 9kcal; 1g protein= 4kcal and 1g carbohydrate = 3.75kcal). So as a principle, trying to restrict the amount of energy dense foods (fat containing foods in particular) on a daily basis will help with weight loss.

The rate at which each individual burns energy is called energy expenditure. This is dependent on a number of factors including the amount of energy you burn off when you are not moving and are at rest, called basal metabolic rate (BMR); the energy you burn off from just digesting food, called the thermic effect of food (TEF) and the energy you burn from movement, called physical activity (PA). Basal metabolic rate in particular is also dependent on a combination of factors including your genes, gender, age and body composition (the amount of fat to muscle mass in your body). This means that everybody has their own individualised metabolic rates.

The Committee on the Medical Aspects of Food and Nutrition Policy (COMA), in their Report 'Dietary Reference Values for Food Energy and Nutrients for the United Kingdom' in 1991, calculated the intake requirements for children, adolescents and adults based upon lifestyles and activity levels of the UK population at the time. The tables below give a rough guide about the caloric intake recommended in children of different ages (Table 1) and adult males and females of different weights (Table 2).

Age	Caloric intake (kcal)/day	Caloric intake (kcal)/day
	Boys	Girls
0-3 months	545	515
3-6 months	690	645
7-9 months	825	765
10-12 months	920	865
1-3 years	1230	1165
4-6 years	1715	1545
7-10 years	1970	1740
11-14 years	2220	1845
15-18 years	2755	2110

TABLE 1: Estimated Daily Average Caloric Requirements for energy (children and adolescents aged 0-18 years)

Weight (kg)	Male Daily Caloric Intake (kcal/day)	Female Daily Caloric Intake (kcal/day)
19-49	2550	1940
50-59	2550	1940
60-64	2380	1900
65-74	2330	1900
75+	2100	1810

TABLE 2: Estimated Daily Caloric Intake for groups of men and women with low activity levels

Energy requirements tend to increase up to the age of 15-18 years with boys generally having slightly higher requirements than girls. This gender difference in requirement also continues into adulthood, due to increased body size and muscle mass in males. After 18 years of age however, energy requirements tend to decrease in both men and women but are closely linked with a person's level of activity.

These tables however were derived at the time of the emergence of the internet, hence I believe with the increased use of social media, screen time and on-line gaming, lifestyles have become even more sedentary and therefore the caloric requirements here should be lowered, particularly in the adult categories, by an additional 100kcal at least.

In the Diabetes Prevention Program, calorie restriction was the major predictor of weight loss. Reduced intake in fat was the second most important predictor whilst physical activity was only an important predictor when the calorie intake was unchanged.(90)

As a general principle, a calorie deficit of 500 kcal/d produces a weekly deficit of ~3500 kcal, which is roughly equivalent to the energy in 1 pound (0.45 kg) of fat tissue.(91) Weight loss trajectories are not linear, nevertheless initial weight loss can be predictive of longer term outcomes. The Look AHEAD trial which looked at patients with diabetes who were overweight found that patients who were in the top third of the group with the highest rates of weight loss in the first 2 months of the study proceeded to have twice as much weight loss at 4 years and 8 years compared with those with those in the lowest third of rates of weight loss.(92)

Most current guidance for obesity treatments in adults recommend the use of continuous energy restriction (CER) which is a daily energy deficit of ~500 or 750 kcals, or a 30% restriction from baseline energy requirements), along with a lifestyle intervention which should include a form of physical activity as the basic tenet for weight management strategies.

Patterns of eating

Intermittent fasting

Intermittent fasting (IF) or the 5:2 diet involves 5 days of regular eating patterns interspaced with two days of very low calorie intake or fasting with a maximum caloric intake of 20-25% of a person's requirements (500kcal for women and 600kcal for men). It is also known as periodic fasting, alternate day fasting (ADF) or more recently intermittent energy restriction (IER).

IER has been shown to be as effective in improving weight in overweight and obese individuals when compared to continuous energy restriction (CER) in the short term.(93) In fact one review suggests better weight loss with IER when compared to CER with comparable effects on improving diabetes risk factors.(94)

Time restricted feeding (TRF) or Time restricted eating (TRE)

The human body is affected by 24hour light-dark clock cycles called circadian rhythms. Modern research has demonstrated that these cycles have significant impact on human and animal biology and behaviours. These rhythms are controlled by the suprachiasmatic nucleus 'central master clock' in the brain which is part of the hypothalamus and in turn signals peripheral circadian clocks in the liver and musculoskeletal system. Desynchronization of this central master clock within the brain with peripheral circadian clocks may give rise to increased risk of chronic diseases.(95,96)

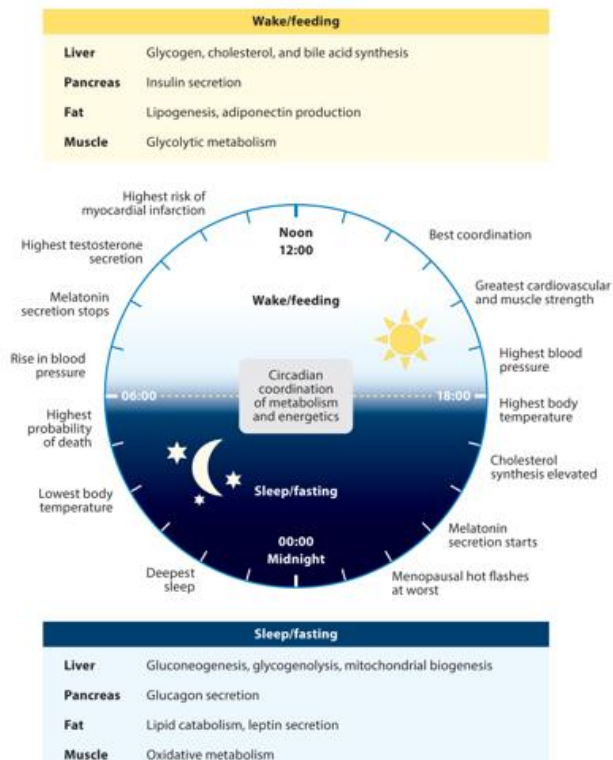


FIGURE 2. Circadian regulation of behaviours, hormones, physiology, metabolism, and energetics. (Taken from Metabolic effects of Intermittent Fasting, Patterson and Sears).

Circadian rhythms have an impact on metabolism throughout the day. For example, insulin sensitivity decreases throughout the day and is least in the night due to circadian patterns in insulin secretion and the suppressive effects of growth hormone which has increased secretion in the night. Hence, meals consumed at night are more likely to be associated with greater postprandial glucose and insulin exposure those consumed during the day, leading to increased blood glucose levels and risk of type 2 diabetes over time.(96,97) Therefore fasting regimens such as TRE that can dramatically reduce energy intake in the evening and night impose a diurnal rhythm of food intake aligned with our biological clocks and lead to improved oscillations in circadian clock gene expression, the reprogramming of molecular mechanisms of energy metabolism, and hence improved body weight regulation. (98–100)

Therefore, looking at the current evidence, not just what you eat but how you eat it contributes significantly to health outcomes. In order to promote healthy weight, we must look at promoting sustainable diets which are balanced and calorie controlled. These should be based on lower GI principles that contain ingredients that are affordable and easily accessible hence promoting sustainability of these dietary changes.

In addition, regulating how these are consumed by promoting fasting periods or restoring circadian principles of eating that are in line with our natural biological rhythms. By ensuring a food-free window of 12-14 hours to encourage a fasted state in the latter half of the day and night, not only will promote weight loss but also better cardiometabolic outcomes and may improve sleep and behaviour. Again these behaviours need to be ones that are sustainable so that they can be incorporated into daily living in the longer-term as part of natural lifestyle change.

Physical activity – what activity and how much

OWL AT THE GYM WALTHAM

A fun group exercise program for kids 10 to 18 years old focused on building strength, gaining skills for sports, boosting self-confidence, and improving health.

Come meet other OWL kids, join a supportive team, and have fun while working out!

2019 Program Dates:
 Winter Session: Jan 16 to March 23
 Spring Session: April 3 to June 8
 Fall Session: Sept 18 to Nov 16

Program Details:
WHEN IS PRACTICE?
 • 2 classes per week, 1 hour per class
 • Two levels available: one for new athletes and one for returning athletes
WHERE?
 • The Micheli Center, Waltham
HOW MUCH IS EACH SESSION?
 • \$100 per participant for each session; that's roughly \$6 per class.
 • Limited financial aid is available; application is required.

What Will You Learn?
 Each week, OWL's personal trainers will incorporate different topics including:
 • How exercise impacts your health
 • How much exercise your body needs
 • How to gauge intensity
 • The importance of warm ups/cool downs
 • How to do strength training and intervals
 • How to be mindful and find creative fun ways to stay active
 • How to build lifelong healthy habits

NOW ENROLLING!
 To learn more or register, please contact our resource specialist, Steven Coletti: 617-919-6566 or steven.coletti@childrens.harvard.edu

OWL ON THE WATER

A unique rowing-based exercise program for kids 12 to 18 years old focused on making exercise fun and building self-confidence while improving health.

Come meet other OWL kids, join a supportive team, and have fun while exercising!

2019 Program Dates:
 Winter Session: Jan 16 to March 9
 Spring Session: March 20 to June 8
 Summer Session: July 10 to Aug 17
 Fall Session: Sept 11 to Nov 16

Program Details:
WHAT DOES PRACTICE LOOK LIKE?
 • 1 hour of conditioning
 • 1 hour of rowing
WHEN IS PRACTICE?
 • 2 classes per week, 2 hours per class
 • Wed 5-7 pm and Sat 8:30-10:30 am
WHERE?
 • Community Rowing Inc in Brighton
HOW MUCH IS EACH SESSION?
 • \$100 per participant for each session; that's roughly \$6 per class. Limited financial aid is available; application is required.

NOW ENROLLING!
 To learn more or register, please contact our resource specialist, Steven Coletti: 617-919-6566 or steven.coletti@childrens.harvard.edu

Two of the community funded OWL physical activity programmes in Boston.

The minimum guidelines for aerobic PA (150 min of moderate or 75 min of vigorous physical activity per week) can improve CV health, although these levels are generally inadequate for clinically significant weight loss or weight maintenance without caloric restriction.(101)

To make sustainable reductions in energy balance for weight loss, the contribution of calorie restriction should be matched to a certain degree by calorie consumption through exercise.

As already mentioned, for weight loss and a reduction in body fat an individual will need to create a calorie deficit. **To achieve a drop of 1 pound (0.5kg) in weight a week, a calorie deficit of 500 calories each day will need to be created.**

When considering caloric consumption, as a rule of thumb, **a mile of brisk walking (1 mile walked in approximately 15-20 minutes) burns approximately 100 calories.** For a more detailed idea of how much certain activities burn in half an hour, the table below taken from the British Nutrition Foundation gives guidance.

Physical activity	Calories used in 30 minutes
Walking	99
Golf	129
Tennis (doubles)	150
Brisk walking	150
Cycling	180
Aerobics	195
Swimming (slow crawl)	195

Tennis (singles)	240
Running (10 minutes/mile)	300
Running (8.5 minutes/mile)	345
Running (7.5 minutes/mile)	405

TABLE 3: Types of activities and the amount of calories burnt in 30 minutes.

Precise advice on exercise activities has to be given with caution as studies on exact types of exercise and the amount to be completed for optimal weight loss are limited.(102) Studies on short bursts of high intensity training have shown remarkable weight loss and improvements in cardiovascular health.(103) Nevertheless, PA programs consistent with public health recommendations may only promote up to modest weight loss (~2-3.5 kg). Responses at individual levels however are very variable. (104,105) Therefore, a combined package of dietary interventions and exercise is needed to achieve healthy weight loss and should be worked out in a measured way through realistic calorie consumption and energy expenditure balance.

Physical activity and Peer support

The importance of family, community and peer support in assisting the undertaking of physical activity is often overlooked despite evidence to suggest that peer support is a successful ingredient to motivating individuals to a lifestyle involving physical activity.(106) A systematic review by Ginis et al, found that peer-delivered interventions led to increases in physical activity behaviour and were just as effective as professionally delivered interventions. In addition, peer support is seen to enhance self-efficacy and self-determined forms of motivation resulting in increased PA.(107) Certainly there is some evidence to suggest that in the longer term, groups supplemented with peer support continue more actively with PA beyond 12 months after completion of PA and health related interventions when compared to those without.(108) Therefore, in encouraging sustainable PA practice, we must encourage patients and families to seek out activities where accountability to each other is key to maintaining the change. It is also far more cost effective in the longer term.

Physical activity and brain functioning

A number of studies have found that habitual exercise and physical activity are associated with academic performance, cognitive function, brain structure, and brain activity in adolescents. These studies suggest that physical activity and aerobic exercise may be important factors for optimal adolescent brain development.(109) Even in younger children, more physically fit children have been shown to have larger brain volumes in the basal ganglia and hippocampus, which demonstrates itself in superior performance in tasks of cognitive control and memory when compared to their less physically fit peers. Fitter children also show better scores on tests of academic achievement.(110,111) Therefore, aiming to optimise physical activity in children is not just essential for reducing obesity related comorbidity risk but is crucial for improving school performance and general brain development as well.

A Successful Citywide Weight Management Strategy – The Amsterdam approach

The Amsterdam Healthy Weight Programme or Amsterdamse Aanpak Gezond Gewicht (AAGG) was implemented in 2013, after the city of Amsterdam pledged in 2012 to eradicate childhood obesity by 2033. In Amsterdam, the prevalence of overweight and obesity is spread unequally throughout the city and population, predominantly affecting children of low income and educational status, including those from migrant and minority ethnic backgrounds. Therefore, this model suits multicultural cities with health and socio-economic inner-city inequalities quite well. It was developed from other successful weight management strategies including the EPODE programme in France, JOGG in Holland, and TCOCT (The Children's Obesity Clinic Protocol) in Denmark; with EPODE being its main influence. The success of this programme in reducing rates of childhood obesity in the region within the City of Amsterdam lies in several fundamental differences observed when compared to efforts in Britain.

Basic tenants of the AAGG – a whole-systems approach

The AAGG recognised at the outset that, to have a successful childhood obesity plan, a whole-systems (WS) approach that joined up multiple service providers was needed.

A WS approach requires expertise from across all sectors to develop a shared understanding of what causes obesity (locally and nationally).(6) The key to driving this joined-up WS approach is the recognition of the fact that no single sector can make a significant difference in isolation to the epidemic of obesity, nor is solely responsible for resolving the problem. Only when all key departments and sectors take ownership and recognise their responsibility to working in partnership to shift culture within communities and contribute to a comprehensive joined-up approach, can a society and culture conducive to good long-term health be established.

There are numerous WS programmes and isolated childhood obesity projects with variable levels of success being delivered across England, however the impact is limited because, unlike in Amsterdam where efforts are joined-up and led from the front politically by national and local government, the current system in England still remains fragmented.

As part of their WS approach, the AAGG included prioritisation of identification and the connection of different schemes that had already existed in Amsterdam. This then enabled recognition of the remaining areas where service provision was lacking, thus only requiring a 'filling-in' of service deficits which in itself was an effective and efficient use of available resource and a money saving approach.(112)

The analogy used by the AAGG in tackling childhood obesity is described in terms of using sandbags as a flood defence. Childhood obesity is identified as a river which has burst its banks. Therefore, to protect society from flooding one has to put sand bags in place as a flood defence, with each sand bag representing a specific policy to combat childhood obesity. In isolation, each sandbag is useless as a flood defence just like isolated approaches and policies which lack momentum to tackle childhood obesity. It is only when we have a large collection of sandbags, which are effectively joined together, that we form a wall of sandbags that interlock and act as a successful flood defence that stems flood waters. By analogy, only when we have a joined-up WS approach with a variety of evidence-based policies that complement each other, can we effectively tackle childhood obesity.

Changing the narrative

The AAGG differs from other healthy weight initiatives in its consideration of childhood obesity as something greater than just a public health issue. They have made it a shared public burden. It has changed the narrative of childhood obesity to being ‘everyone’s business’, rather than just the problem of health and social care sectors. Therefore, the City of Amsterdam has been and continues to urge people to think of childhood obesity as a shared problem, one that everyone must take responsibility for.

One of the principles running through the programme is that **‘the healthy choice should be the easy choice.’** Successful programmes require that we make the concepts to make choices toward healthy lifestyles easy to understand, accessible and affordable for all people. These must bridge health differences between people groups separated by deprivation, social standing, ethnicity and education level. Therefore, this under-pinning principle used by the AAGG acknowledges that eliciting behaviour change in a population requires consideration of complex and multifactorial determinants of childhood obesity with clear and focussed aims that are easy to assess and disseminate to all.

Clear programme goals with clear timelines

The key objectives of the AAGG are clear, with the aim of reducing obesity through (1) enabling children to eat and drink healthy food, (2) increase their physical activity and (3) have good quality sleep. However, in order to focus efforts further to achieve this, the programme goals were outlined in a clear format and distilled down to 7 key guiding principles:

1. To ensure long-term healthy childhoods and futures for children in Amsterdam, the approach has to be viewed as a task that spans a generation.
2. The programme is inclusive of all people, to reduce and eventually eradicate health differences caused by deprivation, social standing, ethnicity, and education level.
3. The approach has to be evidence-based and therefore open to new concepts as new evidence arises with built in reviews and openness to modification - ‘learning by doing, doing by learning’
4. The issue of childhood obesity must be viewed as a shared responsibility.
5. To make the concept of healthy weight and behaviours something that is normalised for future generations with focussed efforts.
6. To create programmes, actions and activities that are sustainable.
7. To focus on prevention but not to neglect the children already affected.

Some of the key differences observed within the UK population and the approach of the UK government lie in the last 4 points. Shifting the culture to using terminology that helps society grasp that unhealthy weight is not born out of blame but is everyone’s responsibility and should be an accepted norm is contentious. Even when Cancer Research UK launched their obesity slogans and campaign to highlight the association between obesity and cancer risk, they came under heavy scrutiny for taking a negative approach to people of large size. This fierce push-back comes from both ends of the spectrum.

Firstly, there are those who claim that putting such information out there generates anxiety around eating and promotes underweight. This is however an abuse of the actual facts that demonstrate that these messages need to go out to the public because the proportion of unhealthy overweight individuals vastly outweighs those who are of an unhealthily low weight in our society. Secondly, push-back also comes from outspoken individuals who may have previously had negative experiences as overweight individuals, and feel this is an attack on physical appearance that is driven by the perceptions bred by the fashion industry and social media rather than recognising that it is simply based on facts associating poor health with overweight and obesity.

Nevertheless, one has to recognise that the use of correct and positive messaging to influence a cultural shift toward healthy weight, be that moving people from an obese state or an anorexic one toward one where an individual has good health outcomes, should be the priority.

The other aspect where the UK government and healthcare is failing the population is in its refusal to see that prevention alone is not good enough. There are thousands of children in the UK who are already severely obese where just change in diet and lifestyle alone on a general population messaging basis will not be adequate enough to restore them to health. These children require investment in services that will directly analyse the issues driving obesity in their lives and develop individualised strategies that will help them achieve and sustain weight improvement. It is these clear expectations that have been critical to pushing the AAGG toward better outcomes.

The AAGG also clearly outlined clear people groups and environments to target in order to reach their objectives, through the 'ten pillars for change'. The first six pillars are meant to be preventative whilst the seventh is aimed to cure and the last three attempt to facilitate change:

1. The first 1000 days of life (from pregnancy through the early years).
2. Schools approach.
3. Healthy living environment approach (healthy urban designs and food environments).
4. Neighbourhood and community approach.
5. Teen approaches.
6. Children with special needs.
7. Those already overweight – assisting them to reach a healthy weight.
8. Learning and research approach.
9. Digital centres and facilities.
10. Communication for behavioural insights and change.

To seal and solidify the plan, an interdepartmental team or task force was established to integrate services from different departments to help them apply interventions in line with these pillars. This multi-disciplinary team was assembled and joined together representatives from the Departments of Health, Housing and Social Support, Sports, Work and Income with collaborative working across sectors including schools, medical professionals, planning bodies, sports organisations, communities, charities and the business sector. Each pillar was mapped to an interdepartmental working party with the responsibility of implementing and bringing about change in their respective area.

To ensure a family-based approach and address the complex needs of the family unit within the programme, every locale or borough had agreements and collaborative working between community organisations, healthcare professionals such as paediatricians and GPs, parent and child representatives, youth counsellors and health care nurses and social welfare professionals. Collaborators had to take a coordinated approach with the aim of boosting family autonomy and self-management in the policies and approaches developed.

Finally, to ensure there is continued progress and to mitigate against the disruption caused by electoral cycles, the AAGG established both shorter and longer term goals with agreed review points to monitor progress of the programme. The programme combined long-term and short-term aims and used analogies about running to communicate these. The ultimate aim for longer term success (depicted as the marathon) was to eradicate childhood obesity over a twenty-year period. Nevertheless, aims were also divided into clearly defined shorter aims and timescales; namely by 2018 (seen as the '5000m' mark) the aim was that all children aged 0-5 years would be a healthy

weight; by the halfway point (2023) the aim was that all children aged 0-10 would be a healthy weight; with the final aim (2033) of all under-18s being a healthy weight.

Driven from the top with enthusiasm

The Obesity Policy Research Unit's report highlights strong political leadership as critical to the success of the Amsterdam AAGG.(113) The City Council's Deputy Mayor (or Alderman) Eric Van de Burg, pushed childhood obesity to the top of the agenda until the executives running the city committed to tackling the issue. This commitment from the city's most senior politician was purposeful and was initiated initially without dedicated funding. It was the intention of the Alderman to use existing resources from all city departments to attack childhood obesity in the first instance.

The contribution of the Deputy Mayor not only in the leadership, vision and commitment to overseeing the AAGG but also the ability to effectively hold every sector to account, was essential to some of its success across the city. In addition, the Alderman outlined at the outset of the project that it should draw on existing resources from within city departments to demonstrate what could be achieved through a whole-systems approach when multiple sectors and stakeholders take joint responsibility of changing the landscape and culture around obesity.

Nevertheless, once a successful model of collaborative working was established, a follow up plan was put in place from 2015 onwards, with annual funding of €2.5 million from the city budget, supplemented with short term funding for specific projects from central government totalling approximately €2.8 million per year.(112)

Therefore, the implementation of an effective childhood obesity programme across a city and ultimately a country demands a joined-up and collaborative 'whole systems' approach driven by effective leadership and ambitious targets.

Fellowship conclusions:

Conclusion 1: Communicating about overweight

The first change medical professionals, commissioners and weight management services will need to make to engage the public more robustly with regards to overweight and obesity, is changing the manner in which we approach the subject with individuals. Both at BCH and CCH, there was no perceived antagonism or dread of consultation observed and the approach was one using positive terminology which avoided stigmatisation around obesity related to size and bad habits. The **communications related and focussed on the health aspects** of being an unhealthy weight.

In addition, they promoted **openness in discussion through exploration of lifestyle** with education on why certain behaviours such as eating particular foods or lack of exercise contribute to obesity outcomes. In addition, there was no assumption that patients understood any of the concepts, thus ensuring everything was **explained from first physiological principles** to providing information on how to make changes using tools such as simple recipe ideas. Lastly, **autonomy** was encouraged through **motivational interviewing techniques**, thus ensuring that changes were precipitated by the individual and their family and agreed in a contractual manner to encourage accountability.

Conclusion 2: Dietary principles and interventions

Dietary principles used to alter diet toward a healthy one were based on encouraging a **low glycaemic index (GI) diet**. These were deemed to be evidence based for better reduction in obesity

related comorbidities such as type 2 diabetes, but also were generic enough to be explored with each individual family to ensure they were affordable, foods they would eat, would keep individuals fuller for longer and were sustainable changes in the longer term. A second principle of encouraging **time-restricted eating** was also being explored at BCH to reduce obesity related comorbidities as well.

To underpin all these dietary principles, I have concluded that basing overall principles on an **easy and measurable system such as caloric counting** which seamlessly extends from energy consumption to energy expenditure in the form of exercise, enables patients to set clear targets for achieving healthy weight. This is made easily accessible through the availability of caloric information on food products and the use of caloric counting applications and technologies. This also then allows prescribing of both energy consumption and expenditure targets which can then be titrated against the results seen in each individual case.

Simple interventional tools such as providing families with a plastic ‘portion control plate’ immediately made portion control more easily administered in the home, whilst the provision of a folder from each clinic with booklets and leaflets reinforcing the principles discussed and the provision of simple snack, breakfast, lunch and dinner ideas made changes more readily acceptable and implementable.

Any intervention suggested for a child must be a **family-based treatment** or a family-centered behavioural approach. This was a standard principle used at both BCH and CCH, however the terminology ‘**the safe-food home**’ was coined and used at BCH. This is key to ensuring that engagement for change from a dietary perspective was fully inclusive of the whole family and therefore did not isolate the primary person with unhealthy weight. This approach also encouraged a responsibility from every member of the household to contribute to the well-being of that individual whilst ensuring sustainable change by altering habits for the whole family. In addition, in the vast majority of cases, the entire family were likely to have more than one individual with unhealthy weight in addition to the person in question.

Conclusion 3: Physical activity

To effectively prescribe physical activity, as mentioned already, requires approaching the subject in terms of caloric expenditure to make it more measurable. However, the key to success in encouraging an individual to increase physical activity is making such activities readily available. In the case of US services, patients could be signposted to community PA facilities because these were funded by stakeholders.

However, in the UK, changing our approach to using readily available and cost-effective solutions is required. This firstly needs to be tailored according to what an individual finds motivational and something they would readily engage with through appropriate questioning. Thinking laterally to provide cost-effective solutions that are readily available either in the community such as ‘park-runs’ or at home such as YouTube exercise videos which provide a variety of styles, durations and intensity of exercises is helpful. However, key to PA success is the provision of peer-support in the form of family engagement with these activities or friendship groups that bring about longer-term sustainability to such change.

Conclusion 4: Service structures and funding streams

Weight management services at both BCH and CCH consisted of full **multidisciplinary teams (MDT)** consisting of paediatricians, dieticians, psychologists and social workers to ensure lifestyle and health issues were explored thoroughly from the outset with patients and their families. MDT

exchange then enabled each case to be discussed and a more personalised and targeted approach could be taken forward with each case with the most relevant professional taking it forward for further follow up.

Follow up patterns were also far more **frequent** than most in-hospital services provided in the UK, with initial 6-8 weekly consultation to re-establish contact and trouble shoot barriers to change, with this eventually being stretched out to 3-6 monthly. This was in addition to community interventions that patients were being directed toward. BCH was also pioneering the use of teleconsultations to encourage contact without causing disruption to patients in terms of schooling and the need to travel long distances to attend hospital based appointments.

Lastly, funding for services was derived from individualised payments through patient healthcare insurance for the MDT services rendered. However, **partnership of services with relevant stakeholders** facilitated gifted funding pots that made new intervention implementation, community based interventions and the provision of tools for patients possible, thus facilitating change more easily.

Conclusion 5: Community and city-wide change

The approach to tackling childhood obesity has to be done using a **whole-systems approach**. This ranges from tackling issues at an individual level within the healthcare setting and schools, to bringing about cultural shift toward healthy lifestyle change at community, city-wide, regional and national level. At the latter end, **legislation is key** to shifting advertising trends and industry toward promoting healthy lifestyle messaging and practice at population level.

However, at city-wide level, where addressing individualised community needs such as deprivation or environmental and town planning, **a programme of change with clear goal setting and targeted timelines is required**, as observed from the Amsterdam strategy. In addition, the approach needs to engage a wide variety of stakeholders to bring together a whole-systems approach in tackling the underlying factors contributing to a bio-socioeconomically driven disease.

Lastly, **primary engagement for change needs to come from the top**. This is clearly lacking on a national level in the UK and on a local level in most cities. It appears that this is due to a lack of understanding on the part of politicians and councillors in recognising that the health of their communities is strongly related to their socio-economic environments and that moving entire communities toward healthy lifestyle change not only improves outcomes in terms of obesity but also mental health, academic performance and general wellbeing; and in the longer term, reinvests economic gains through higher rates of performance in the population. Any change made is also subject to political and electoral cycles with no investment in a robust long-term approach which requires years of subtle and gradual modelling toward better outcomes.

Therefore, in undertaking this Churchill Fellowship, it is my hope that my pursuit to investigate how to stem the tide of rising childhood obesity will contribute to change in healthcare in my hospital practice, in regional networks that I am involved in and through engaging with wider remits for change such as my city-council, as a start.

Through this Churchill Fellowship I have learnt some important lessons and principles to stemming the tide of rising childhood obesity that I can now apply to improve the treatment and management of the condition in my own hospital practice, regionally by influencing the networks that I belong to.

Recommendations

In line with the 5 conclusions above, I list a number of recommendations that I believe are key to stemming the tide of childhood obesity.

Recommendation 1: Talk the talk.

Clinicians need to overcome their fears of addressing conversations around obesity. This requires them to be informed regarding the significant adverse physical and mental health outcomes that arise from unhealthy weight (obesity). It is also essential to engage patients and their families using the right terminology that avoids the use of stigmatising and punitive language and promotes a positive, health-related understanding of the impact of obesity that encourages 'Healthy Weight and Wellness.'

Recommendation 2: Empower individuals so they walk the walk.

Autonomy amongst patients must be encouraged through motivational interviewing techniques, thus ensuring that the decision making process for lifestyle changes is owned by the individual and their family. Changes must be individualised and actively chosen and agreed in a manner to encourage accountability within the home situation and immediate community.

Recommendation 3: Make things simply measurable across the board.

Lifestyle changes to achieve a healthy weight should be measurable in a single format across energy intake and energy expenditure. Therefore, basing overall principles of change using caloric counting which can seamlessly extend from counting total calories consumed in food eaten to calories burned through exercise, enables patients to set clear targets for achieving healthy weight. In addition, these targets can be individualised and tailored in children even according to age and can be altered according to results seen to improve outcomes. Access to caloric information is now easily accessible through food labelling of products, calorie counted recipes and the use of caloric counting applications and technologies making this easier to do.

Recommendation 4: Choose dietary interventions that are scientifically shown to reduce obesity-related comorbidities – Low GI and TRE.

Obesity related lifestyle changes should not be just about achieving a set weight but about improving health. Hence adopting dietary principles that are sustainable, achievable and also shown to improve health related outcomes is best. Adopting low GI principles can be translated across the board from obesity management into the diabetic arena alongside time-restricted eating principles. Therefore, these should be adopted and underpin dietary recommendations offered.

Recommendation 5: The Sister Sledge hammer to obesity - We are family.

Any intervention to tackle childhood obesity must adopt a family-based treatment or a family-centred behavioural modality. This ensures that the primary individual concerned is not isolated, penalised or marginalised in tackling their unhealthy weight. This approach also encourages a responsibility from every member of the household to contribute to the well-being of that individual but also ensures sustainable change by altering habits for the whole family, especially in the vast majority of cases where unhealthy weight and habits will be a theme that runs through the entire family.

Recommendation 6: Exercise – reduce the pain and increase the gain

To make exercise meaningful to individuals, it needs to be measureable. Clinicians need to prescribe exercise with clear targets. Hence, approaching the subject in terms of a 'caloric expenditure prescription' to make it measurable and relational to food consumed, makes it more effective.

The key to promoting engagement and success is in making recommendations to increase physical activity that are enjoyable at an individualised level (through the choice of music related activities, competitive activities, group activities or personal sessions) that are easily accessed. Therefore, signposting individuals to the use of technologies such as free Youtube videos, exercise apps, local amenities such as gyms and ParkRuns is essential. Any solution proposed must be cost effective and readily available to encourage regular engagement.

Lastly, the key to sustainability and long-term engagement with exercise is the involvement of peer-support in the form of friendship groups or family to encourage accountability, without which, lifelong lifestyle change will be impossible.

Recommendation 7: Healthcare T.E.A.M – Together, everyone achieves more.

Obesity is a multicomorbidity disease that has a multifactorial causality. To develop successful Health services that bring about healthy-lifestyle change in families and their children, we require a concerted effort within our healthcare system in the UK at Clinical Commissioning Group (CCG) level to establish fully-funded multidisciplinary teams that provide a whole-person approach to bringing about healthy weight and wellness.

Recognising that these services need to run across lifestages (cradle to the grave services) to tackle the various obesity-related comorbidities that are experienced is essential. Tackling obesity does not stop at prevention, neither does it start only at the point of dire health outcomes such as type 2 diabetes or cardiovascular disease. Therefore, a healthcare strategy that runs through public health into primary care and forward into hospital medicine and back again to facilitate improved healthcare outcomes for all is required.

In addition, partnership between healthcare providers and community stakeholders is needed to provide effective lifestyle change packages and prescriptions for those involved that are readily accessible.

Recommendation 8: What you sow is what you reap – it takes a village to raise a child!

Obesity and its health implications are socio-economic, lifestyle, genetic and ethnicity related diseases. They can endanger and increase the risk of entire populations to unexpected conditions such as the COVID-19 pandemic, as we have just discovered. Therefore, city-wide and community-based approaches are required using a ‘whole-systems approach’ to influence cultural change and bring about change within entire communities. There is a role for councils, educational authorities, healthcare providers, community services, supermarkets, town planning and transport agencies and numerous other stakeholders to all play an integral part in an effort to stem the rise of obesity.

In addition, involvement of governmental bodies at the highest level to bring legislative changes to nudge the UK population toward healthy lifestyles is necessary for change. Lastly, this will require investment, forethought and intentional decision making by councils and government to bring about gains not just for us but for future generations.

Next Steps

This fellowship has enabled me to glean management principles observed from clinical practice at BCH and CCH and further investigate the medical literature and evidence that underpins the management techniques and interventions used at these two world-class children’s hospitals. It has informed and changed my clinical practice in several ways and my next steps are to:

1. Disseminate the information learnt across on a number of platforms – my first priority is for the publication of this report to stir interest into how the fellowship has shaped my methodology in developing a more robust and evidence-based clinical practice in childhood obesity. The second will be to take components of this and convert them into more lay-friendly reading in the form of blog entries, of which some are now published on my Wordpress blog 'ThePracticalPaediatrician'. This can be shared across a number of apps including Twitter, LinkedIn and Facebook to reach a larger audience and readership. Thirdly, these strategies will be submitted for a more clinical audience into publication within the medical literature. Lastly, I have also presented some of these findings as lectures to Manchester City Council (January 2020) and as medical grandround lectures at the Royal Manchester Children's Hospital which, since the onset of COVID-19, now has an online viewership with a Regional Northwest reach.
2. The interview techniques and enquiry tools analysed and developed further have been turned into a clinic proforma for our complex obesity service at the Royal Manchester Children's Hospital. This clinic proforma can be adopted for use within any paediatric complex obesity service as it is both generic and gathers essential data to help clinicians make helpful recommendations. It also utilises motivational interviewing techniques to empower patients and their families to choose healthy lifestyle changes that are measurable, achievable and sustainable. This will be launched in our clinics in the summer of 2020.
3. I, along with my team of dietitians are developing an educational tool that can be provided to all patients and their families to help them work through 12 important steps to achieving a healthy weight which encompass dietary and physical activity recommendations, most of which have been informed from my fellowship. We hope to secure funding to put this into press for patients in the future; along with a recipe guide to empower families who are short of time and finance to cook healthy, affordable and tasty meals that cater to the UK palate.

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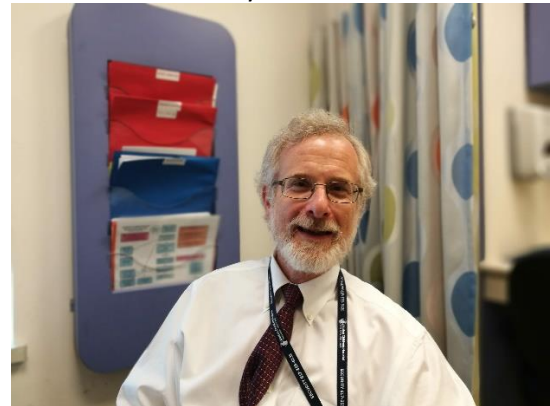
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Appendix 1 – Patient Enquiry Questionnaire for Childhood Obesity

RMCH COMPLEX OBESITY SERVICE PROFORMA			
Name DOB Address		Age: Height: Weight: Previous weight: BMI: BMI SDS: % Fat: Trajectory: Loss / Maintain / Gain Blood pressure:	
Birth History: (Gestational diabetes, Birthweight, Feeding difficulties, Developmental milestones)			
History of weight gain: Age of onset? Hyperphagia (Satiety, Eating odd foods)? Recent trajectory (weight 1 year ago)		Interventions so far and success	
Past medical History: (Other conditions, Learning difficulties, Genetic syndrome, CNS tumour/trauma)			
Obesity related comorbidities (ORCs):		•	
Insulin resistance / Type 2 Diabetes (polyuria/dipsia, acanthosis nigricans)	Y/N	Joint pain	Y/N
Eating disorders (Binge eating, vomiting)	Y/N	GI problems (Gastroesophageal reflux / abdominal pain / Constipation)	Y/N
Asthma	Y/N	PCOS (Age at onset of puberty / Irregular periods / Oligomenorrhoea / Amenorrhoea / Hirsutism / Acne)	Y/N
Sleep apnoea / disordered breathing (snoring, sleep quality)	Y/N	Oedema	Y/N
Headaches (last eye check, papilloedema)	Y/N	Psychological issues (bullying, low self esteem, depression, ADHD)	Y/N
Subclinical hypothyroidism	Y/N	Liver dysfunction	Y/N
Other problems			
Obesity related signs:			
Low energy	Y/N	Dry skin / falling hair	Y/N
Exercise intolerance	Y/N	Visual changes	Y/N

		Striae / stretch marks / Cushingoid appearance	Y/N
Family History: (Maternal and paternal BMI, CVD risk, Diabetes)			
Dietary history: Does the family eat together? (days per week) Does the family eat at the table? Are meals eaten in front of the TV? Is it a food safe home?		Who cooks meals (childcare / split family)? Are meals cooked from basic ingredients? Cooking Methods (Fry / Bake / Boil) Time without food (Time limited eating < or > 12 hours) Is there satiety?	
Dietary walk through the day			
Breakfast			
Lunch		School dinner / packed lunch	
Dinner			
Snacks (crisps, chocolate)			
Puddings / sweets			
Drinks: How much liquid/day Sugary drinks / juice Dairy (type of milk, yoghurt)			
Fast food (#/week) Take away (#/week)			
Fruit and veg (servings per day)			
Estimated daily caloric intake			
Type of eater: Picky, binger, grazer Fast / slow Meal skipper / snacker Food aversive behaviours (autism)			
Mood eating			
Boredom eating			
Snacks in the room or eating during screentime?			
Covert eating – sneaking food			
Food engagement – cooking, food shopping			
Barriers to dietary change:			
Physical activity and hobbies			
Hours and type of Sporting activities			

No. Days with 1 hr exercise/week No of sessions of PE at school	
Hours of screentime (TV, gaming, computer, phone) weekday weekend	
Other activities (walking pet) Hours studying	
Rough calories burnt a day	
Exercise preferences: Preference for group sport or exercise in isolation	
Likes competitive activities	Y/N
Likes measurable activities	Y/N
Ability to swim / cycle?	Y/N
Exercise buddies / family exercise	Y/N
Local facilities (pool, gym, park) / park run / youtube videos	
Mode of travel to school	
Barriers to exercise:	
Psychological assessment:	
Schooling Name of school: Year: School performance: Absences:	
Stressors – school, learning challenges, home	
Emotional health assessment:	
Method of dealing with sadness, anxiety, depression, stress	
Evidence of emotional eating?	
Family history of depression	
Relaxation activities as a family	
Hobbies	
Screentime (4 things to do before – homework, house chores, exercise, conversation)	
Family involvement (family buy in for change)	
Is there evidence for binge eating?	
Is there a history of abuse (domestic, sexual)?	
Sleep: Duration - How many hours per night (min 8-10hrs)? Sleep time and wake time? Are there tech devices in the room? Y/N Quality of sleep (falls asleep easily, wakes in the	

night) No. of naps during the day	
Examination:	
Targets:	
Weight target (maintenance or loss 5-10% if ORCs present):	
Calorie target:	
Food safe home and family engagement for all:	
Dietary change (improve GI, reduce fat):	
Time limited eating target (min 12hour gap):	
Snacks v treats:	
Swapshop:	
Exercise target:	
3 changes the patient want to try to achieve (Motivational technique):	
1.	
2.	
3.	
Medical plan:	
	Clinician:
	Date: