Department of
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Technical University of Munich

Future of Health
- Child Health and Wellbeing

Abstract Book: Interdisciplinary Summit 2022

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Prolog

Renate Oberhoffer-Fritz
Dean of the Department of Sport and Health Sciences,
Chair of Preventive Pediatrics, Technical University of Munich

Ladies and Gentlemen,

This abstract book reflects the contributions of international experts at our Summit on the Future of Health 2022. Healthcare systems around the world are facing challenges caused by rapidly changing societies, environmental influences on health, and the impact of technology on healthcare. These critical issues form the basis of our annual Summits on the Future of Health.

Our 2nd annual Summit had a primary focus on the health and well-being of children and adolescents. Children represent our future and have the right to grow up healthy. Their well-being must be one of our top priorities to enable a healthy aging society and to curb the explosion in global healthcare costs. The COVID-19 pandemic has highlighted the importance of child health and the need for greater awareness.

Child health unites a multitude of researchers and health promoters in Bavaria, including those at the TUM within the Department of Sport and Health Sciences and the School of Medicine, as well as partners like the German Youth Institute and the Bavarian State Sports Association, among many other affiliated institutions. In order to promote the cooperation of these partners in child health research and health promotion, the alliance CHAMPION (Child and Adolescent Health Promotion and Prevention) was inaugurated at TUM during the 2nd Summit on the Future of Health.

We are honored and appreciative that the Bavarian State Minister of Health and Care, Klaus Holetschek, has taken over the patronage of the Summit and for his support for CHAMPION. This initiative fits with the central objectives of the Bavarian Prevention Plan, which serves as the cornerstone for efforts to promote health within society.

Greeting

Gerhard Kramer
Senior Vice President Research and Innovation,
Chair of Communications Engineering, Technical University of Munich

Dear Colleagues, dear Students, dear Guests and Friends,

Welcome to the 2022 Summit FUTURE of HEALTH: CHILD HEALTH and WELLBEING. This is the second time that the TUM Department of Sport and Health Sciences is hosting this summit. Last year's event took place virtually due to the Corona Virus, but the event was a big success. Fortunately, this year we can engage in direct interaction here at the Olympic Park in Munich, at the largest university sports campus in Germany and the home of the department. We are very pleased that Klaus Holetschek, Minister of the Bavarian State Ministry of Health and Care has accepted patronage for the 2022 event, as he did last year. And thank you to Prof. Renate Oberhoffer-Fritz, Mr. André Andonian, Dr. Sara Schulz, and their team for organizing the event.

This Summit focuses on essentials for sustainable child and adolescent health. Such an event can be successful only if all stakeholders take part; our participants come from all sectors: academia, industry, governance and society. The COVID pandemic has had long-lasting negative consequences for child development and health. For example, significant weight gain has been observed in adolescents. Physical alienation, virtual schooling, increased screen time, and less physical activity have contributed to unhealthier lives. The pandemic has also accelerated and exacerbated many of the existing ethnic and socioeconomic health disparities. A UNESCO statement confirms that non-communicable diseases - including cardiovascular disease, diabetes, preventable cancers, and chronic respiratory diseases - pose a threat to children and adolescents worldwide. Health promotion interventions for children and adolescents are needed that increase their physical activity, provide healthy diets, and better food choices, strengthen their mental health, and promote overall healthy behaviors in a sustainable way. This means creating good strategies, including new digital solutions that can play a motivating role for families today. Prevention is the keyword!

At TUM, we have long recognized this. The TUM Department of Sports and Health Sciences has consistently evolved and expanded to include a focus on health and prevention. The department performs scientific research on these topics and works towards translating research results into practice. The department's Prevention Center has many measurement, analysis, and examination methods with which they work to counteract diseases of our civilization such as obesity, heart attacks and strokes. More than 3,000 young people study sports and health sciences here, in cooperation with the LMU and the new TUM School of Social Sciences and Technology. This includes teaching and vocational training in health and nursing sciences. The department trains teachers and provides new pedagogical tools to inspire students to exercise, sports and health care. Furthermore, the long-standing experience of the department in the topic of child health led to the founding of a multi-disciplinary alliance: the "Center for Health Promotion and Prevention in Childhood and Adolescence" or in short "CHAMPION". TUM supports this because health promotion is most sustainable if started as early as possible. And as broadly as possible.

For broad success, creating cooperative alliances is decisive, both with internal partners and external partners. For this reason, TUM is transforming its organizational structure from faculties to a matrix structure of schools and integrative research institutes that promote innovation. The new structure will empower the topics of prevention in the future TUM School of Medicine and Health. We will give prevention and health promotion a separate profile and bring these topics into the sphere of influence of TUM Medicine with its expertise in precision diagnostics and personalized therapy. But prevention is not a local or even a national topic alone, but an international topic. That's why it is great to see that you are here with such a broad range of perspectives and competencies. This summit allows you to exchange thoughts and experiences, and calibrate your knowledge across academia, politics and society.

What is there to expect in the following days? First, inspiring talks by experts from several fields of research on challenges and the fundamental changes that are needed for a sustainable child and adolescent health. Second, an autumn school accompanies the event. Our students, doctoral researchers, and postdocs will actively participate and develop innovative and sustainable health solutions for children and adolescents in small interdisciplinary groups. Please enjoy the lectures, enjoy the company, and get to know TUM and our beautiful city of Munich.

Topics

- NCDs in childhood and the role of COVID-19
- Perspectives of prevention
- Health behavior

NCDs in childhood and the role of COVID-19

WHO's work on health promotion and prevention among children and adolescents

Martin Weber
Program Manager for Child and Adolescent Health and Development, Division of Health Policy and Country Health Systems (CPS), WHO Regional Office for Europe

The *European Technical Advisory Group on Schooling during COVID-19* was established by the WHO Regional Director for Europe in August 2020 and was composed of a wide range of stakeholders supported by a Secretariat at the WHO Regional Office for Europe. The key recommendations brought forward by the Advisory Group highlight that youth participation is an important component and all policy considerations for the school year should start with the goal of having students physically present in school as far as possible. Results show that mitigation measures might have common adverse effects on long-term educational, behavioral, mental, and physical health outcomes. Furthermore, the outbreak could provide an opportunity to strengthen school infrastructure, staffing, health literacy, and overall health-promoting behaviors and environments. The most alarming issues for child and adolescent health in Europe include childhood obesity, inadequate health literacy in schools, inability to access health services independently, barriers in accessing sexual reproductive health services, exceeding recommended daily screen times, and struggling with mental health issues. The 2 major networks, “Health Behaviors in School-aged Children (HBSC)”, and “Childhood Obesity Surveillance Initiative (COSI)” are examples of collaborative efforts aimed at better understanding the health behavior patterns among children and adolescent population groups. The HBSC network conducts European-wide surveys every four years and COSI is a collaboration interested in children’s nutrition, height and weight with the participation of 38 countries across the WHO European Region. One should not forget that schools play an important role in health promotion by setting examples, encouraging health literacy, and providing access to counselling services. Hence, all schools should be health-promoting schools. Schools for Health in Europe (SHE) is a regional network of 45 member countries that aims at placing health promoting schools as an integral part of policy development in education and health. It is evident that COVID-19 has highlighted many weaknesses in child and adolescent health in Europe. The Center for Health Promotion and Prevention in Childhood and Adolescence (CHAMPION) can play a crucial role in supporting strategic efforts to improve child and adolescent health.

Pathophysiology of Long Covid, what we know in children, what we know in adults, and what are the implications?

Brendan Delaney
Chair in Medical Informatics and Decision Making, Department of Surgery & Cancer, Faculty of Medicine, Imperial College London

Several gaps have been identified in the medical definition of Long Covid or Post-COVID-19 condition, especially with regards to Long Covid being described as a diagnosis of exclusion. A study conducted in Denmark among SARS-CoV-2 tested positive and negative patients demonstrated the risk differences of symptoms such as dysosmia, dysgeusia, fatigue, and dyspnea after 6-12 months of disease. Certain immune system abnormalities such as specific elevations in inflammatory and anti-viral responses, significant perturbations in glucocorticoids, no exhibition of increased autoantibodies to extracellular proteome, and altered humoral responses to distinct herpesviruses have been identified in Long Covid patients, and potential biomarkers such as cortisol, CCL20, CCL19, CCL4, Galectin-1, IL-8, and LCN2 have been identified through various machine learning approaches. A case-control study by Su et al. (2022) identified possible risk factors of Long Covid such as viral load, autoantibodies, EBV reactivation, inflammation, and differences in T cells in convalescence. Kell et al. (2022) hypothesize that endothelial inflammation can lead to the formation of amyloid blood clots which may be linked to activated platelets, further contributing to the development of various chronic conditions, including Long Covid syndrome. A case-control study by Douaud et al. (2022) utilized MRI scans and cognitive function tests to report small reductions in global brain size, limbic damage, and loss of function in short-term memory among Long Covid patients. Xie et al. (2022) evaluated the risks and 12-month burdens of incident post-acute COVID-19 cardiovascular outcomes compared with the contemporary control cohort by care setting of the acute infection. The main cluster of clinical presentation of Long Covid in children includes neuropsychiatric symptoms such as chronic headaches, brain fog, and concentration difficulties, gastrointestinal symptoms such as nausea, and recurrent abdominal pain, and other organ-system symptoms such as post-exertional malaise, myopericarditis, tachycardia, arthralgia, myalgia, etc. The evolution of a Mild Covid condition into either Long Covid syndrome, full recovery, or other acute post-infectious complications in children could be linked to possible underlying disease pathways of COVID-19.

Mental health before and during the pandemia

Volker Mall
Medical Director, Chair of Social Pediatrics, TUM School of Medicine,
Technical University of Munich

The psychosocial impact on development and mental health is influenced by institutional care and the effects of the intervention. Buechel et al. (2022) conducted the CoronabaBY study among 2940 parents of children aged 0 to 3 years in three distinct phases of time, namely phase 1 from February 2021 to June 2021, phase 2 from June 2021 to October 2021, and phase 3 from October 2021 to March 2022. The CoronabaBY study utilized several standardized study instruments such as the pandemic-specific questionnaire, parent stress index, state-trait-depressions questionnaire, regulation disorder questionnaire, and strengths and difficulties questionnaire to measure the study outcomes. The CoronabaBY study findings revealed the highest pandemic burden during phase 1, and consistently increasing indices for parental stress such as emotional availability, lack of empathy, etc., and regulation disorders such as crying, sleeping, eating, etc. across all phases and being the highest in phase 3. The "MFED scaled by cognition, expressive and receptive language, and gross and fine motor function" study conducted by Friedmann et al. (2022) aimed to assess the impact of the COVID-19 pandemic on children's developmental outcomes. The study included a sample of 715 participants who were tested prior to the pandemic and a sample of 866 participants who were tested during the pandemic. The researchers used a multi-factor evaluation tool known as MFED, which assesses different aspects of children's development such as cognition, expressive and receptive language abilities, and gross and fine motor skills. The MFED study findings revealed that among infants aged from 0 to 6 months old, developmental milestones such as seeking eye contact, laughing vocally, etc. were significantly earlier pre-pandemic, as well as among children aged from 6 to 12 months stretching arms to be picked. Among children aged from 12 to 18 months old, imitation of domestic activities was achieved earlier during the pandemic, whereas the execution of simple household tasks among children aged from 18 to 24 months was significantly later. Carbone (2020) highlights the importance of primary prevention in managing the mental health impacts of COVID-19 by flattening the initial infection curve and then further flattening the delayed mental ill-health curve.

Prevention of chronic diseases in childhood

Julia Hauer
Head of the Children's Center Munich, Professorship of Pediatrics and Adolescent Medicine, TUM School of Medicine, Technical University of Munich

Chronic diseases in childhood are complex in etiology and influenced by immune system capability, genetic predisposition, and exposures such as stress, infection, nutrition along milestones of development. Children with chronic diseases need highly specific care because chronic disease have a high impact on the individual patient and an economic impact on the health care system. There is an emerging interest in exploring specific chronic diseases in childhood such as diabetes, cancer, and Chronic Fatigue Syndrome currently with a remarkable incidence after infection with SarsCov2. In child and adolescent health there is a high interest of prevention, either primary prevention or secondary prevention. As an example colleagues at the childrens hospital are tightly interconnected with Helmholtz institutes and GPPAD (consortium headed by Prof Anette Ziegler) consortium for primary prevention of Diabetes mellitus Type I. Within this consortium the SINT1A intervention study by Ziegler et al. (2021) is aimed at the prevention of Diabetes Mellitus Type 1 by exploring the role of B infantis and other persistent confirmed multiple beta-cell autoantibodies. In pediatric oncology a different approach is pursued, genetically evaluating the affected child, father, and mother to identify the classical genetic predisposition syndromes for childhood cancer as well as the variants of unknown significance using the whole exome sequencing technique. The goal of the Trio study is to identify genetic mutations or changes that may increase a child's risk of developing cancer or side effects from therapy. The results of the Trio study can provide important information for the diagnosis, treatment, and management of childhood cancer. As an third example Chronic Fatigue Syndrome includes neurocognitive symptoms, neuroendocrine symptoms, autonomic symptoms, and immunological symptoms, and has a complex etiology that might be possibly associated with SARS-CoV-2 and EBV. There is an urgent need for diagnostic, preventive, and therapeutic collaborations between global networks. Munich CHANCE-DZKJ and CHAMPION will provide usefull structures to improve the delivery of care for patients with chronic diseases.

Children, adolescents and the social determinants of health

Matthias Richter
Chair of Social Determinants of Health, Department of Sport and Health Sciences, Technical University of Munich

It is the need of the hour to focus on the inequalities in young people's health because they are valued for future potential, they have a special need for protection, they have limited control over their living conditions, and they are highly sensitive to environmental stimuli usually with lifelong consequences. The Health Behavior in School-aged Children (HBSC) study utilizes data from school-based cross-sectional surveys conducted every four years in over 50 countries among 11-, 13-, and 15-year-old children and adolescents to observe a trend in inequalities in subjective health measured in terms of self-rated health, psychosomatic complaints, and low life satisfaction. The determinants and mechanisms of health inequalities are complex to elucidate, however, it is postulated that socioeconomic status is linked to health through various material factors such as living circumstances, noise, financial difficulties, behavioral factors such as smoking, physical activity, nutrition, and psychosocial factors such as stress, coping mechanisms, social support, that can further impact health inequalities either directly or indirectly. Empirical evidence suggests that young people with low socioeconomic status have a higher risk of adverse health outcomes, hence, child and adolescent health is closely associated with social determinants of health. There is a strong need to develop a life course approach considering the peculiarities of different life stages and to focus on the interplay between young people and the institutional contexts in which they act. The life course approach views health and well-being as the result of complex associations between individual biology, social circumstances, and environmental factors, rather than the result of any one single factor. It takes into account the different stages of life, from infancy to old age, and the transitions that occur throughout the lifespan, such as childhood, adolescence, and parenthood. The life course approach is a holistic, interdisciplinary perspective that considers the impact of events and experiences throughout a person's lifespan on their health and well-being. Current population patterns of health, including social inequalities of health, can be found not only in prevailing health theories focusing on decontextualized and disembodied risk behaviors and genes, but in the social, material, and ecological contexts in which we are born, develop, and interact.

Perspectives of prevention

Preventing a lost decade: supporting every community to become a foundation for healthy lives

Didier Jourdan
UNESCO Chair “Global Health & Education”
Head of the WHO Collaborating Centre for “Research in Education and Health”
INSPE Clermont-Auvergne, Research group ACTé EA 4281, France

The impact of the Covid crisis on the health and education of children is multidimensional and it has resulted in a loss of learning, discrimination increase in the socioeconomic skills gap, deterioration of overall well-being and restricted access to school meals, vaccinations, and social care which disproportionately affected children from disadvantaged backgrounds. Furthermore, the widening of inequalities has led to the most marginalized and vulnerable children being the most afflicted by health, education, and socioeconomic disparities. The COVID-19 pandemic has had far-reaching consequences for people's mental health, leading to a sharp increase in mental health issues at a global level. There has been a sharp increase of 13% in mental health issues at a global level, and children from low-income households may be especially vulnerable to the negative secondary impacts of the COVID-19 pandemic. This increase can be attributed to various stressors and challenges brought on by the pandemic, such as fear of illness and death, economic insecurity, social isolation, and disruptions to daily life and routines. In addition to that, other forms of inequalities such as an increase in gender-based violence, reduction in vaccination coverage, a shift in the pattern of food consumption, inequalities in access to the internet, and disruption of family planning have become more prevalent.

However, it is critical to recognize that children and young people are not the problem, they are a part of the solution! They are the key agents of change. Environment, health, and wellbeing are unifying themes for this generation.

To move forward education is critical. Learning for health and wellbeing (health literacy and citizenship for health) can be promoted through formal, non-formal, and informal education.

Education, health behavior and sickness

Health Literacy in schools: a sustainable approach to reach children and adolescents

Orkan Okan
Professor of Health Literacy, Department of Sport and Health Sciences, Technical University of Munich

Health literacy is an interdisciplinary concept by design and it has many roots, including medicine, healthcare, public health, and education. Health literacy entails people's knowledge, motivation, and competencies to access, understand, appraise, and apply health information to make judgments and take informed decisions regarding health promotion, disease prevention, and health care. The three layers of health literacy are functional health literacy, interactive/communicative health literacy, and critical health literacy. Parker and Ratzan (2010) suggest that health literacy is a relational concept at a personal and organizational level. Brach et al. (2021) define organizational health literacy as the degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others. Studies show that low levels of child and adolescent health literacy are linked to unhealthy behaviors, problematic health communication, problems in critical health thinking, and poor health outcomes. The Health Literacy in Childhood and Adolescence (HLCA) study by Bollweg et al. (2022) found that subjective health literacy is a strong predictor for mental and physical well-being, subjective health status, and health behavior. Evidence suggests that personal and organizational health literacy are interrelated and they are determinants of health-related attitudes and behavior. Okan (2019) suggests that early childhood, school age, and adulthood are the key points of intervention for the promotion of health literacy during life. The challenges and barriers to promoting health literacy during school age that has been identified are lack of awareness regarding the concept of health literacy, absence of mandatory curriculum or policies, dearth of teachers trained in health domains, and limited time to address non-curricula topics in schools. The global WHO agenda is to enhance the health literacy of the general population through systems-level actions by 2025 through strategic objectives such as generating new evidence on population health literacy, creating a global mechanism and surveillance system for health literacy, and creating a data-driven dashboard system to inform policy and service development.

Children's upbringing and well-being in families

Sabine Walper
Chairman and Director Deutsches Jugendinstitut e.V

The major trends observed in families over the years are increasing diversity in families, increasing socio-economic inequalities among families, and intensification of parenting. Evidence suggests that about every third marriage ends in divorce, almost every fifth family household is headed by a single parent, about every tenth family is a stepfamily, and around 0.1% of families are rainbow families. Numerous findings point to the negative impact of parental separation on children's psychological health and well-being which may be attributed to financial strain, parental conflict, co-parenting problems, and parents´ psychological stress, mostly resulting from parental separation, but partly also preceding it. Poverty has also been linked to family risk factors and children's impaired health. More broadly, Kalmakis & Chandler (2013) highlight the detrimental role of adverse childhood experiences (ACE) such as parental separation, poverty, alcohol/drug abuse, emotional neglect, and emotional abuse which are closely associated with health disruption in children. According to Witt et al (2019), the cumulation of four and more ACE leads to a 10-fold higher risk of depression, anxiety, physical aggression, and low life satisfaction later in life. Adverse childhood experiences can influence health and well-being throughout the lifespan through various underlying mechanisms such as disruption of neurodevelopment, social, emotional and cognitive impairment, adoption of health-risk behaviors, development of disease, disability, and social problems, and eventually leading to early death. The late effects of adverse childhood experiences in adulthood can be passed onto the next generation through mothers who are at risk of emotional unavailability, atypical parenting, and child abuse. Furthermore, mothers' early experiences of maltreatment have been shown to be associated with children's attachment problems, behavioral and emotional problems, and weaker cognitive development in children.

These findings highlight the importance of addressing and preventing adverse childhood experiences. This can include supporting families, providing access to mental health services, and promoting healthy environments for children to grow and thrive in. The key implications for prevention are developing screening instruments to identify risk groups, promoting health literacy, and establishing joint cross-sectoral efforts involving the health system, social services, and educational system to strengthen children's and adolescents´ health support and promote overall well-being. By addressing adverse childhood experiences and promoting positive childhood experiences, we can help prevent long-term health consequences and improve the health and well-being of children and future generations.

Changing beliefs around prevention: perspectives from low- and middle-income countries

Nikkil Sudharsanan
Rudolf Mößbauer Tenure Track Professorship of Behavioral Science for Disease Prevention and Health Care, Department of Sport and Health Sciences, Technical University of Munich

The burden of disease is changing in low- and middle-income countries from infectious conditions to preventable non-communicable diseases. However, in many settings health beliefs have not changed as fast leading to a mismatch between beliefs and prevention. A longitudinal investigation was conducted and multiple waves of population-based cohort data was analyzed to highlight the importance of beliefs (Mauer et al., 2022). It showed that policies solely aimed at improving diagnosis or initiating treatment may not lead to long-term hypertension control improvements in middle-income countries since many individuals who take treatment incorrectly stop this treatment over time. The findings of the study highlight the importance of implementing comprehensive policies that address the multiple factors that contribute to hypertension control, especially behavioral barriers to effective hypertension treatment and management. By taking a holistic approach to hypertension control, the health and well-being of people with hypertension in middle-income countries can be improved. Kroeger et al. (2021) & Sudharsanan et al. (2021) conducted studies that aimed to investigate the reasons behind inconsistencies in the usage of blood pressure medication in individuals with hypertension. Gaps in knowledge and beliefs about the etiology of hypertension and how to best control hypertension were found. Changing such beliefs will be essential for improving prevention but LMICs face an important challenge, as traditional approaches to behavior change, such as behavior change counselors, will be costly and challenging to scale. Through the studies, it was found that alternate approaches, such as using WhatsApp and phone-based messaging to target false beliefs can be an effective strategy that can be easily implemented in low- and middle-income countries to reduce missed follow-up visits for patients with chronic non-communicable diseases such as hypertension, and eventually modify the health belief systems of patients. Changing the beliefs of adults with diagnosed conditions can be an important tool in establishing and normalizing the idea of disease prevention and encouraging preventative health behaviors since childhood.

Policy solutions

Child Public Health: Public Health Services - opportunities and obstacles

Heidrun Thaiss
Honorary professorship for Health Promotion, Technical University of Munich,
Former head of the Federal Institution for Prevention and Health Education (BZgA);
President of the German Society for Social Pediatrics and Youth

Widespread failures at multiple levels in the global COVID-19 response including public health practice have led to millions of preventable deaths and reversal in progress and years of setbacks towards the sustainable development process, WHO says (Lancet COVID-19 Commission, 2022) Focusing on children, public health action can be defined as an action at policy, organization, and local levels to improve the overall health of children and young people, to reduce inequalities in their health status, and to advocate for their rights The vision for child public health is healthy people/healthy children in healthy communities. The mission is to promote physical and mental health and prevent disease, injury, and disability. Three key elements of child public health practice are disease prevention, protection from risks, and promotion of education, implemented by the public health system with public health agencies at state and local levels, healthcare providers, public safety agencies, human service and charity organizations, and education and youth development organizations. Child public health services have the power of monitoring vintage health, surveillance, research, education and implementation as well as quality development. Schoolchild health checkups, school vaccination programs, and German early childhood intervention programs are examples of child public health services that emphasize current obstacles such as workforce, equipment, and commitment and indicate future opportunities such as health in all policies, capacity building, and health equity. Furthermore, prevention and early intervention programs have even demonstrated an ability to reduce crime, lower substance abuse, improve educational outcomes, decrease teen pregnancy, reduce teen suicide attempts, lower child abuse, and reduce domestic violence. In addition, the Heckman Equation (by the Nobel Prize-winning economist,) demonstrates that investing in early childhood development builds the human capital needed for economic success. According to the Heckman Equation, investing in early childhood development can have a positive impact on an individual's future productivity and earnings potential and incidentally strengthen their parents' resilience By investing in early childhood development, policymakers can help to ensure that children have the necessary foundation to succeed in life and contribute to economic growth and states' welfare.

Be Smart - Don't Start: School-based smoking prevention - lessons learnt after 25 years

Reiner Hanewinkel
Head of Institute for Therapy and Health Research, IFT-Nord

Onrust et al. (2016) conducted a systematic review and meta-regression analysis of 288 school-based programs to reduce and prevent substance abuse in different age groups among 436,180 participants in total. The findings of this systematic review suggested that different child developmental stages offer different opportunities for the prevention of substance use which can be taken into account when designing school-based prevention programs. The Be Smart – Don't Start program is a school-based smoking prevention program. The requirement for participation in the program is that at least 90% of pupils in class should vote in favor of participation. The program has several key elements such as different brochures for target groups such as teachers, parents, and principals, smoke-free contracts, newsletters, creative class activities like a smoker's menu, and a certificate of appreciation. In the school year 2021-22, about 2,449 schools participated in the Be Smart – Don't Start program, comprising approximately 6,488 classes, 170,000 students, and 4,598 teachers. Furthermore, almost 49% of the teachers and 31% of the classes participated more than once in the program. Estimating since the beginning of the program in 1997, approximately 5 million students have participated to date. The program has been evaluated through several different approaches over the years including process evaluation, outcome evaluation, cost-effectiveness analysis, potential iatrogenic effects, meta-analysis, implementation, and dissemination. Hoeflmayr et al. (2008) conducted a cost-effectiveness analysis of the 'Smoke-free class competition'. They found that the program prevented 3,076 students from becoming established smokers in the school year 2001/2002 with direct net benefits of 5.59 million Euro and total net benefits of 15 million Euro. Hoeflmayr et al. (2008) further reported that the direct benefit/cost ratio was 8.2 and the total benefit/cost ratio was 3.6. These results suggest that the 'Smoke-free class competition' was a cost-effective intervention for preventing smoking among middle school students in Austria. The findings of Hoeflmayr et al. (2008) highlight the importance of school-based programs for preventing smoking and the potential benefits of investing in such programs. By preventing students from starting to smoke, such programs can help to reduce the overall burden of smoking-related diseases and improve public health.

Impressions

Health behavior

Nutrition

Adipogenic programming of metabolic disease and early prevention: the mother-child cohort PEACHES

Univ.-Prof. Dr. Regina Ensenauer
Head of the Institute of Child Nutrition, Max Rubner-Institut, Karlsruhe, Germany

Beside the high obesity rates in adults, an ever-increasing number of children develop nutrition-related diseases such as overweight or obesity. Furthermore, 43% of pregnant women in Germany in 2021 had overweight or obesity at the time of conception. The programming of health outcomes takes place already during the first 1000 days of life, which defines a window of opportunity for preventive interventions. Overnutrition of the fetus in the womb due to pre-conceptional obesity and/or excessive weight gain during pregnancy, as well as metabolic disorders such as gestational diabetes, smoking during pregnancy, and the absence of breastfeeding, have unfavorable effects on the cellular and organ development of the child in this early stage of life.

The increased and/or qualitatively unbalanced provision of nutrients leads to maladaptation of the fetus, programming an increased risk for overweight and type 2 diabetes. The investigation of these influences through mouse and human studies, such as the prospective mother-child long-term cohort PEACHES with 1707 mother-child pairs, and the development of biomarkers for early detection of a child's risk for metabolic disease, as well as the development of life-stage-specific preventive measures as “re-programming” strategies are the main research focus of the Institute of Child Nutrition.

Severe Malnutrition: feeding strategies for the microbiome

Kathryn Maitland
Professor of Tropical Paediatric Infectious Diseases, Faculty of Medicine and Director of the ICCARE Centre at the Global Centre of Health Innovation,
Imperial College London

Child malnutrition is a silent emergency and raises a grave public health concern. Malnutrition can be classified as Marasmus, Marasmic-Kwashiorkor, and Kwashiorkor. The WHO guidelines on the management of severe acute malnutrition in infants and children require revisions to recent updates. The health outcome is critically dependent on the presenting condition of the patient as either stable or unstable. Stable severe malnutrition occurs in 25% of hospital admissions, while the majority of children tend to present with severe complications at the time of admission. African children have a high inpatient mortality of about 15-20% and the long-term health outcomes are relatively poor, which can be represented by a 10% mortality rate in the six months following the primary admission, and a substantially high relapse rate resulting in redevelopment of severe malnutrition. Maitland et al (2006) observed an overall inpatient mortality of 19% among patients with severe malnutrition and found that it was largely associated with cardiovascular instability and gastrointestinal pathology. The CAPMAL Study by Brent et al. (2019) was conducted from 2011 to 2013 among 92 severely malnourished patients and 23 controls. The study assessed the heart function of severely malnourished children and one of the major findings of the study was that there was no evidence to substantiate if severely malnourished children had cardiac dysfunction. The CAPMAL Study also found that marasmus and kwashiorkor phenotypes had similar cardiovascular profiles. Talbert et al. (2012) reported that around 49% of patients present with diarrhea at admission and the comorbidity of diarrhea with gram-negative bacteria increases the risk of death by 6-folds which suggests that gastrointestinal dysfunction may contribute to outcomes in malnutrition. It is hypothesized that deranged gut mucosal integrity may result in the translocation of gram-negative enteric organisms and endotoxins. Hence, restoring gut health and intestinal microbiome may improve short- and long-term health outcomes. The public health impact of severe malnutrition is alarming. It is estimated to contribute to 1-2 million deaths each year. Therefore, it is crucial to address this issue to improve the overall health and well-being of the population.

Developmental pathways towards overweight and obesity – lessons learnt from the GUSTO study

Johan Gunnar Eriksson
National University of Singapore, Department of Obstetrics & Gynaecology,
Yong Loo Lin School of Medicine and Singapore Institute for Clinical Sciences, A*Star

The Developmental Origins of Health and Disease (DOHaD) hypothesis is based on the concept that the origins of several lifestyle-related diseases are formed during fertilization, embryonic, fetal, neonatal and early stages of life by the interrelation between genes and the environment. It is suggested that health and human potential begin before birth and the first 1,000 days are a time of tremendous potential and enormous vulnerability. They serve as a critical window when the foundations of lifelong health are built. Obesity is usually measured by body mass index (BMI), however, BMI does not provide a precise measure of the overall adiposity. The Growing Up in Singapore Towards healthy Outcomes (GUSTO) Study is a longitudinal study launched in 2009 using phenotyping and bio-sampling techniques across several domains in 1,247 mother-child pairs among 3 Asian ethnic groups. The study explored the associations between the abdominal adiposity of neonates and maternal gestational diabetes mellitus status and maternal mid-gestation vitamin D status. The effectiveness of precision interventions was tested through machine learning simulation models in target groups and ages. The body fat deposits were assessed by magnetic resonance imaging and spectroscopy. The GUSTO Study found that the mismatch between poor fetal growth and rapid postnatal growth is linked to elevated liver fat, and the children experiencing a developmental mismatch between the fetal and postnatal period may be at an increased metabolic risk. A longitudinal cohort study such as GUSTO Study offers valuable insights across a lifespan. Hanson & Gluckman (2011) suggest that by implementing early interventions, the risk of adverse health outcomes can be reduced. Early interventions refer to actions taken at an early stage of development, such as during pregnancy, infancy, and childhood, aimed at improving the health and nutritional status of individuals. Hanson & Gluckman (2011) highlight that the timing of these interventions is critical as it provides a window of opportunity to make lasting and positive changes in a person's development and health. By addressing adversities including malnutrition during these critical periods of growth and development, it is possible to reduce the long-term consequences of malnutrition, such as stunted growth, decreased cognitive function, and increased risk of disease.

Digitalization

Digital technology in learning and education

André Andonian & Raymond Chan
McKinsey & Company

Learning methodologies have transitioned tremendously through human history from observation and imitation during pre-historic times, to memorization and veneration of books during antiquity to middle age, furthering to classroom-style learning during modern times, and lastly evolving to self-driven and personalized learning during the contemporary era. The world is evolving at an exponential speed, and tailored learning is emerging as a macro-trend for the current age. The evolution of education is fueled by technologies and the major stakeholders in the dynamics of education are educators, learners, policymakers, investors, and business owners. COVID-19 created a structural upheaval in the education landscape with approximately 1.6 billion children being put out of school globally leading to a rise in loss of learning and inequity in the quality of education. However, a dramatic increase in the use of technology for educational purposes was observed as an emerging trend in the learning landscape during the pandemic. The spectrum of education trends has accelerated from focusing on traditional subjects to holistic personal development, standardized content to personalized content, and linear learning to modular learning over time. Emerging trends such as parents as key stakeholders in learning, on-demand anytime/anywhere learning, and new ways of engagement were identified globally during COVID-19 times which suggest that technology will be embedded in the future of student learning to create more personalized and immersive learning experiences. These trends suggest that technology will play an increasingly significant role in shaping the future of education. However, the potential risks of accelerating economic, structural, cultural, and digital disparities need to be considered for fully unlocking the potential of technology-based learning in the near future. Redesigning the education ecosystem is the need of the hour, and Singapore and Estonia serve as leading examples to pave the path. The need for redesigning the education ecosystem is imperative to ensure equal opportunities for all students.

Digital technologies for child and adolescent mental health

Ara Darzi
Co-Director of the Institute of Global Health Innovation, Paul Hamlyn Chair of Surgery, Imperial College London

Mental health problems begin early and studies show that 75% of mental health problems are established by the age of 24 years and one in every tenth child aged 5 to 16 years have a diagnosable mental health condition. The COVID-19 pandemic has had a significant impact on mental health and well-being. Mental health issues have been exacerbated by the COVID-19 pandemic, and it has been reported that 60% more young people have probable mental health conditions in the year 2021 as compared to 2017. This highlights the importance of addressing mental health and providing adequate support and resources to those who need it. It is crucial to raise awareness of the impact of mental health on individuals and society and to reduce stigma and discrimination against those experiencing mental health problems. The 2020 WISH Report elucidates that mental health needs will now not be met by traditional care alone, and more innovative and effective solutions are required to holistically approach this grave public health problem. The WISH Report highlights the pressing need for innovative and effective solutions to address the growing mental health burden in light of the COVID-19 pandemic. Digital mental health tools mediated by consumers and health systems both, can be useful across disease prevention, prediction, intervention, and management pathways. Digital technologies have the potential to enable rapid scalar of low-cost interventions, however, key opportunities are being missed in terms of rigorous evaluation of digital tools, and accurate understanding mental health needs of the dynamic global population. The Shout Care Service provides insights into the experiences and expressions of people struggling with psychological distress and aims to improve the conceptual understanding of mental health conditions. The Shout Care Service found that suicide, depression, and anxieties were the most commonly reported mental health issues. Most users were between the ages of 14 to 24 years, and the majority of the users, up to nearly 76%, were female. Research studies aimed at predicting texter volume, drawing predictions from conversation content, and drawing predictions from message content were guided by the data obtained from the Shout Care Service. The Shout Care Service provides a valuable resource for individuals seeking support and helps to shed light on the extent of the mental health crisis.

From gamification to habitualization: how digital solutions can integrate physical activity into everyday activities

Stephan Jonas
Director Institute for Digital Medicine, University Clinic Bonn

The Physical Activity Guidelines for Americans recommend children and adolescents aged from 6 years old to 17 years old to perform 60 minutes or more of moderate to vigorous physical activities on daily basis. This can include a range of activities such as running, jumping, cycling, and playing games that increase the heart rate and make them breathe harder. This level of physical activity is important to build and maintain physical fitness, develop healthy bones and muscles, and improve mental health. Regular physical activity also helps reduce the risk of developing chronic diseases such as obesity, type 2 diabetes, and cardiovascular diseases in adulthood. Gamification through mobile physical activity applications aims to provide motivation for healthy activities. This approach leverages the natural drive to play and compete to motivate individuals to be more active, by incorporating features like points, rewards, and competition into physical activity programs. By making physical activity more engaging and fun, gamification through mobile applications aims to increase motivation and encourage people to incorporate more healthy activities into their daily routine. Studies show that 61.7% of gamers use their smartphones to play games and gaming habits seem to be evenly distributed across all age groups. It is postulated that gamification can be a motivator for the promotion of useful human behaviors. The key drawbacks of gamification are high attrition rates and low average playtime. The goal of habitualization is to establish unconscious behavior patterns through a large number of conscious repetitions until the desired behavior becomes automated and unconscious. However, it has often been observed that the conscious process tends to be tedious and is regularly aborted before a habit is developed. A presented Healthy Navigation application is designed to develop healthier travel habits and is optimized for incorporating individual fitness goals, displaying health gains through routes, and nudging towards healthier route alternatives with similar travel times. Gamification can support short-term health goals, and habitualization requires grinding repetitions, therefore, it is important to devise innovative solutions so that screen time and daily physical activity can effectively overlap.

Youth's engagement with digital technologies during the pandemic and possible implications for well-being

Sandra Cortesi[1] & Urs Gasser[2]
[1]Senior Research and Teaching Associate, University of Zurich and Director of Youth and Media, Berkman Klein Center for Internet & Society, Harvard University
[2]Dean of the TUM School of Social Sciences and Technology, Professor of Public Policy, Governance and Innovative Technology, Technical University of Munich

Growing up in the digital world necessitates a need to better understand the expectations, attitudes, and concerns of young people related to digital technologies for improving their health and well-being. The Youth and Media team at the Berkman Klein Center has been engaging young people in consultations around the concept of "well-being" and, inspired by Eurostat's quality of life indicators and UNICEF's dimensions of well-being, co-designed with youth a new understanding of this concept. According to youth, the concept of well-being appears to be broader than the concept of health and it includes subjective and objective dimensions, along with the principles of digital understanding. Well-being comprises an overall experience of life that is influenced by the natural living environment, living conditions, social interactions, education/school/skills, play, hobbies, work, basic rights and opportunities to participate, economic and physical safety, and mental and physical health. It is particularly important to recognize that well-being has a subjective dimension as well, as it depends on several factors such as the activities one likes to engage in, where one lives, and one's access to digital technologies, among other factors. In the context of well-being, school and family can be a stressor as well as a stabilizer. On one hand, these factors can provide stability and support, helping individuals to feel safe, secure, and valued. On the other hand, the same variables can also be sources of stress, causing individuals to feel overwhelmed, anxious, or disconnected. The overarching meta-theme is that youth behaviors and digital technologies are dynamic and constantly evolving. Against this backdrop, digital technologies are a relevant source to access and engage with health information, especially for the younger population groups. However, it is essential to understand the importance of perspectives while analyzing and interpreting youth health behaviors. Studies show that participatory mechanisms can encourage the involvement of youth in research design by empowering them to bring change to the world. There is a need for transforming state-of-the-art offline approaches for the digital world and developing integrative models to connect different spheres of youth experiences.

Autumn School
Workshop: Let's design children's health experiences together!

Sabine Müllauer[1] & Schirin Lucie Richter[2]

[1]Director Health and Business Development, Daylight Design
[2]Senior Partner, Future Medical Systems

Daylight Design and Future Medical Systems joined forces at the Future of Health Summit to host an interactive workshop on Design Thinking in healthcare. Design Thinking is a powerful methodology that enables the development of user-centered and innovative solutions. In the realm of healthcare, where diverse stakeholders and intricate ecosystems intersect, Design Thinking holds immense value.

The workshop featured an action-packed afternoon dedicated to a children's health design challenge. Participants gained a comprehensive understanding of Design Thinking's fundamental steps: Research, Synthesis, Ideation, and Prototyping. To provide real-world context, the challenge centered around a girl diagnosed with Growth Hormone Deficiency (GHD).

Through interviews with the girl, her parents, her siblings, and their treating physician, participants gained insight into the everyday challenges associated with this chronic condition. Major themes emerged, including medication adherence, emotional hurdles in school, social stigma, the need for deeper understanding, and the importance of consistent and empathic communication. These themes guided the participants in formulating concrete questions and exploring ideation.

The brainstorming session generated a multitude of ideas, with participants selecting the most promising ones for prototyping. The need for communication inspired the idea of an app that would facilitate tracking treatment progress, managing challenges, and sharing information among all stakeholders.

Participants found the workshop to be an excellent starting point for incorporating human-centered design and Design Thinking into their daily work. They recognized the value of developing a profound sense of user empathy and honing design skills to foster innovative solutions, particularly within the complex landscape of children's healthcare.

Design Thinking has the potential to revolutionize healthcare by placing the needs of patients and their families at the center of innovation. This workshop was a testament to the significant impact it can have on improving the lives of children with chronic conditions.

Program overview

12. OCTOBER 2022

TIME	TOPIC: NCDs in childhood and the role of covid-19	
12:30	Foundation Center for Health Promotion and Prevention in Childhood and Adolescence (CHAMPION) Welcoming words & introduction summit	Klaus Holetschek (Bavarian State Minister of Health and Care) Gerhard Kramer (Senior Vice President Research, TUM) Renate Oberhoffer-Fritz (Dean Department of Sport and Health Sciences) André Andonian (Advisory Board TUM SG)
13:15	Martin Weber (WHO) *WHO's work on health promotion and prevention among children and adolescents* Brendan Delaney (IC) *Pathophysiology of Long Covid, what we know in children, what we know in adults, and what are the implications?*	
	Panel discussion	Moderation: Renate Oberhoffer- Fritz
	Coffee break	
14:45	Volker Mall (TUM ME) *Mental health before and during the pandemia* Julia Hauer (München Klinik) *Prevention of chronic diseases in childhood* Matthias Richter (TUM SG) *Children, adolescents and the social determinants of health*	
	Panel discussion	Moderation: Renate Oberhoffer-Fritz
17:00	Get together	

13. OCTOBER 2022

TIME	TOPIC: Perspectives of prevention	
9:00	Welcoming words and reflection	Renate Oberhoffer-Fritz, André Andonian
9:10	Didier Jourdan (UNESCO/WHO) *Preventing a lost decade: supporting every community to become a foundation for healthy lives*	
9:30	Education, health behavior and sickness Orkan Okan (TUM SG) *Health Literacy in schools: a sustainable approach to reach children and adolescents* Sabine Walper (LMU/DJI) *Children's upbringing and well-being in families* Nikkil Sudharsanan (TUM SG) *Changing beliefs around prevention: perspectives from low- and middle-income countries.*	
	Panel discussion	Moderation: Matthias Richter
	Coffee break	
11:30	Policy solutions Heidrun Thaiss (TUM SG) *Child Public Health: Public Health Services - opportunities and obstacles* Reiner Hanewinkel (IFT-Nord) *Be Smart - Don't Start: School-based smoking prevention - lessons learnt after 25 years* Lars Hartenstein (McKinsey Health Institute) *Generation Z*	
12:30	Panel discussion	Moderation: Orkan Okan
14:00	Workshop for students (Daylight Design: Design Thinking)	

14. OCTOBER 2022

TIME	TOPIC: Health behavior	
9:00	Welcoming words and reflection	Renate Oberhoffer-Fritz, André Andonian
9:10	Nutrition Regina Ensenauer (MRI) *Adipogenic programming of metabolic disease and early prevention: the mother-child cohort PEACHES* Kathryn Maitland (IC) *Severe Malnutrition: feeding strategies for the microbiome* Johan Gunnar Eriksson (NUS) *Developmental pathways towards overweight and obesity – lessons learnt from the GUSTO study*	
10:30	Panel discussion	Moderation: Karsten Köhler
	Coffee break	
11:30	Digitalization André Andonian & Raymond Chan (McKinsey) *Digital technology in learning and education* Ara Darzi (IC) *Digital technologies for child and adolescent mental health* Stephan Jonas (Univ. Bonn) *From gamification to habitualization: how digital solutions can integrate physical activity into everyday activities* Sandra Cortesi (Harvard) & Urs Gasser (TUM SOT) *Youth's Engagement with Digital Technologies During the Pandemic and Possible Implications for Well-Being*	
13:00	Panel discussion	Moderation: André Andonian
13:30	Summary of all days	André Andonian, Renate Oberhoffer-Fritz

Technical University of Munich
Department of Sport and Health Sciences

Georg-Brauchle-Ring 60/62
80992 Munich

www.sg.tum.de

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