FROM SCIENCE TO SCHOOL

From Science 2 School: Sustainably healthy – active & veggy

Survey of the prevalence of vegetarian diets linked to sports & physical exercise
among Austrian pupils, teachers and principals of secondary levels I and II

DE: www.science2.school
EN: www.science2.school/en

Big Picture

PART 1 – Background -> Dual Approach 2 Health

PART 2 – Food = Medicine

PART 3 – Exercise = Medicine

PART 4 – Lessons 2 be learned

PART 5 – Work in Progress & Future Perspective

Background 2 Issue

2 global-scaling health problems of pressing concern & greatest urgency <-> from childhood into adulthood & old age

Physical inactivity „crises“	Overweight/obesity „epidemic“
21. Jh.: Current levels of PA/inactivity hit an all-time low[1]	**Alarmingly high rates (still rising) of overweight/obesity**
EU member states[2] ➢ 59 % of Europeans never exercise/participate in PA, sports & exercise ➢ 42 % do not exercise/participate in sports at all Matching global numbers: 36.8 % (Western/high-income = +31.6 %)	**EU member states[1]** ➢ in 87 % (46) member states >50 % of adults: 30 – 70 % of adults suggested overweight, with 10 – 30 % by obesity ➢ Obesity: potential to trigger … (1) prediabetes & diabetes, (2) hypertension & high cholesterol levels, and (3) heart diseases & cancer
Inactivity major cause[2] … **… 20 min/day only would reduce risk:** ➢ CVD (5 – 30 %) <-> – 30 % CVD ➢ Diabetes mellitus type 2 (7 – 27%) <-> – 27 % Diabetes mellitus type 2 ➢ Breast & colon cancer (10 – 25 %) <-> – 21 – 25 % breast/colon cancer ➢ Premature mortality (9 – 10 %) **Kids & adults: less active than 20 min/day (150 min/week)[3]**	**Associated with chronic health conditions: childhood/adolescence -> adulthood[2]** ➢ Hypertension: at age 4 rsults in higher blood pressure at age 6 ➢ Abnormal fat metabolism; fatty liver ➢ Hyperglycemic status/diabetes mellitus type 2 ➢ Joint problems/damage ➢ Respiratory problems at night ➢ Atherosclerosis ➢ Asthma, etc.
Austrian Health Report on Children & Adolescents (5 – 19 yr) [4,5] ➢ **73 – 85 % (females > males) do not reach recommended PA 60 min/day** **Current WHO-HBSC 2017/18 Report[6]** ➢ **81 % (females > males) don´t reach recommended PA 60 min/day (vs. 19 %)** ➢ Proportion of young people being involved in PA remains low (see: 2014)	**Austrian Children (5 – 19 yr)[3]** ➢ 30 % overweight/obese (male > female) vs. 13 – 28 % of adults **Current WHO-HBSC 2017/18 Report[4]** ➢ **21 % overweight/obese (male > female)** ➢ **Most adolescents fail to meet nutritional recommendations: 2 in 3 do not eat sufficient nutrient-rich foods daily, eg. fruit & vegetables** (see: 2014)
[1]Haskell et al. (2007a+b), WHO (2004); [2]EurActiv Special Report (2015), Guthold et al. (2018),Lee et al. (2011, 2012), WHO (2015); [3]WHO (2010a+b, 2015); [4]BMG (2016:78-79); [5]IOM (2005); [6]WHO-HBSC 2017/18 (2020a+b)	[1]WHO (2003, 2015, 2016a+b), [2]Kreger (2015), Ho (2009), Ortiz-Pinto et al. (2019); [3]Bentham et al. (2017), BMG (2016, S. 67-68, 71); [4]WHO-HBSC 2017/18 (2020a+b)

Background 2 Issue

Health of nations <-> personal health

-> improvements on a personal basis by healthier lifestyles through behaviour & habits
-> comprehensive lifestyle changes necessary

Search for effective tools & interventions to improve Individual Health -> Public Health

-> achieve: lifelong sustainable health
-> control/drop skyrocketing health-care costs arising from NCDs increasingly -> unaffordable by nations

Health shaped by various interwoven factors[1] … for good or bad by …

personal behavior (40 %) most impact

Vs. Medical care (10 %) least impact

Shaping public health resulting from personal health

-> by **conscious decisions & changes in personal lifestyle**

Lifestyle – factors, behavior, habits:

- Alcohol
- Smoking (Nicotine)
- Basic view/perspective of life (positive vs. pessimistic)
- Family & love
- Friends & Relationsships
- Environmental factors, e.g. living, working, chemicals, etc.

Total cumulative personal impact (behavior & habits) vs. health care system: 90 % vs. 10 %

Goal: Effective measures & solutions for better personal health -> improvements in personal lifestyle -> Public Health

(1) Sustainable & lifelong health
(2) Reduce/stabilise the exploding health care costs ag. further increasing NCDs

[1]Schroeder (2007)

Background 2 Issue

NCDs accountable for 71 % of all death worldwide
with most cases are preventable & even reversible![1]

Top-5 risk factors for of global mortality[2]…

(1) Hypertension (13 %)
(2) tobacco use (9 %)
(3) high blood glucose (6%)
(4) physical inactivity (6 %)
(5) Overweight/obesity (5 %)
<-> GBD (2019) = 1 in 5/every 5th person dies due to poor/unhealthy diet (Western Europe: 20 %)
too little fruit, vegetables, legumes, whole grains, nuts & seeds, but in excess meat & processed meat, salt

Sound: Both lifestyle factors … are well known associated health effects
-> diet & PA, sports & exercise **-> good predictors of mortality**
-> **for better or worse: key** in development of NCDs
e.g. CVD, DT2, cancer & their risk factors[3]

Although:
Both lifestyle factors each well-accepted with positive effects & shape good health[4,5]

Consensus:
Diet *higher* impact affecting health than PA, Sports & Exercise

[1]WHO (2020: 2.11.2020): https://www.who.int/health-topics/noncommunicable-diseases#tab=tab_1; Bentham et al. (2017);
[2]WHO (2009); GBD Study 2017 (Lancet, 2019) ; [3]Beaglehole et al. (2011), Euractiv Special Report (2015), WHO (2009, 2010a+b, 2015);
[4]AND (2015, 2016), Deriemaeker et al. (2010, 2011) Key et al. (2006); [5]Gries et al. (2018), Myers et al. (2015)

Naturally: Dual Approach 2 Health

„Life is activity
but without motion life does not take place.“
Moshe Feldenkrais

PA, Sports & Exercise is Medicine

Food is Medicine

„Let food be thy medicine
and medicine be thy food.“
Hippokrates

Dual Approach to sustainable Health

Lifestyle factors

Diet permanently related to PA, Sports & Exercise

COVID-19: Experts on PA & Sports

5. March – 28. May 2020 (no Sport in groups; relaxations since 29. May)

„*To prohibit movement outdoors was neither knowledge-based, nor* did the forced quarantine prevent the infection *favorably* influenced.

Rather the opposite is the case,
and the undesirable side effects due to the overlong lockdown, especially in children, were certainly considerable."

Dr. med. Martin Sprenger
Public Health Experte, ehem. Mitglied BMG-Expertenbeirat
Offener Brief an den Gesundheitsminister (29. 5. 2020)
https://www.addendum.org/coronavirus/offener-brief-martin-sprenger/

Low levels of PA can have *negative* effects on the health, well-being and QOL (stress, mental). **PA can be valuable tools to help you to protect your health.**

WHO recommends to …
"Stay physically active during self-quarantine"
<-> approx. 20 min/day
150 min of moderate or 75 min of vigorous PA/week can still be achieved even at home, with no special equipment and with limited space.

WHO (25. 5. 2020)

Children typically obtain their daily PA through
- ✓ active travel to school
- ✓ physical education
- ✓ organised sports, games, and dance
- ✓ active play, and
- ✓ pending time in playgrounds and parks

Well-established that *physical inactivity* can lead to an *increase in* the development of *chronic diseases*

-> prolonged home stays such as months of *social lockdown* -> … resulting in subsequent *negative impact on health & fitness of children & adolescents*

PubMed-Search (2. 6. 2020) -> total 43 hits vs. 3 matches on: COVID, Sport, Physical Exercise, Physical Education, School, Child

Guan et al. (2020) Promoting Healthy Movement Behaviours Among Children During the COVID-19 Pandemic.
Chen et al. (2020) Returning Chinese school-aged children and adolescents to physical activity in the wake of COVID-19: Actions and precautions.
Chen et al. (2020) Coronavirus disease (COVID-19): The need to maintain regular physical activity while taking precautions.

WHO with PA, Sports & Exercise tips during self-quarantine provided online (25. May 2020):
http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov-technical-guidance-OLD/stay-physically-active-during-self-quarantine?fbclid=IwAR3QGWe_fktH477OnO9dLfD8Tt5oyGg7nHCOhCPZ0Knv9aIw_LCDMO3n_qw#article
WHO with *Food and nutrition tips during self-quarantine* provided online (25. May 2020):
http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov-technical-guidance-OLD/food-and-nutrition-tips-during-self-quarantine?fbclid=IwAR0IxmHZqgX-uwgq0cNTsDM3BdHUqgV8EcFbqiY3olALGzBP_hbzW6AwYnA

COVID-19: Experts on Nutrition

„As long as people eat ***meat***, there is going to be some ***risk of infection***".

Dr. Gauden Galea, WHO Representative, CNN Transcript (20. 1. 2020)
http://transcripts.cnn.com/TRANSCRIPTS/2001/20/wrn.01.html

„The problem is the ***hunger for meat*** in the expanding society."
„Whether armadillo or pig – ***meat consumption increases the pandemic risk***".

Prof. Dr. Christian Drosten, Virologe an der Charité Berlin
Stern-Interview (21. 3. 2020), Spiegel online Archiv (28. 3. 2020)

„ To reduce the ***likelihood of future epidemics***, we must always think about our way of life.

An important consequence for the time after this epidemic is therefore, ***to reduce drastically meat production and meat consumption***."

Prof. Dr. Oliver Razum
Leiter der Arbeitsgruppe „Epidemiologie und Int. Public Health",
Universität Bielefeld.
Neue Westfälische Zeitung (25. 3. 2020)

„Best food buys"
WHO recommends 6 of 9 from plants:

Long-lasting fresh fruits & vegetables
Frozen fruits & vegetables (high-fibre & vit.)

Dried & canned pulses
Whole grains & strachy roots
Dried fruits, nuts & seeds
Canned vegetables

Eggs, canned fish, milk

WHO (25. 5. 2020)

PubMed-Search (2. 6. 2020) -> total 19 hits vs. 0 matches on: COVID, Food, School, Child

WHO with *Food and nutrition tips during self-quarantine* provided online (25. May 2020):
http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov-technical-guidance-OLD/food-and-nutrition-tips-during-self-quarantine?fbclid=IwAR0IxmHZqgX-uwgq0cNTsDM3BdHUogV8EcFbqiY3olALGzBP_hbzW6AwYnA

Simple Formula – ‚Super'-Medicine

Dating back to ancient times: food and PA, sports & exercise considered Medicine
consensus: both lifestyle factors <-> positive health effects[1-4]
Dual guidelines since 2002[5]

PA, Sports & Exercise[6] **=** **Medicine**

+ Diet[7] **=** **Medicine**

‚Healthy eating – Active living'[8] **= ‚*Super*'-Medicine**

Shaping sustainable health & longevity
Individual Health → Public Health

-> best results from cumulative health effects:
2 main pillars of health permanently linked together

[1]AND (2015, 2016), Deriemaeker et al. (2010, 2011) Key et al. (2006); [2]Gries et al. (2018), Myers et al. (2015); [3]Turner-McGrievy et al. (2016), Wilson (2016); [4]Diehl et al. (2012); [5]IOM (2005), OECD (2015a+b);
[6]Jeukendrup (2018): https://twitter.com/jeukendrup/status/849548949216268288 (28.3.2018), Khan et al. (2012); [7]Greger (2017, S. 23), Oberbeil & Lentz (2015, S. 9–14, 38, 100), PCRM (2018): www.pcrm.org/health/diets/vegdiets/frequently-asked-questions-about-nutrition#RecommendVegDiet; [8]Tuso et al. (2013a);

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Veggy-Boom at all ages & social groups

Google, Forbes & The Economist:

- Forecast: **2019 further growth** of Veggie market -> **in mainstream even more pronounced than before**
- **Trend towards a healthier & more sustainable way of dealing with food,** eg. health, food ressources, climate, etc.

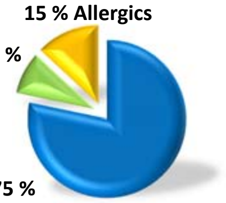
10 – 14 % of population vegetarian or vegan[1] -> **Tend unbroken for AT & DE: 43 % eat vegetarian & 17 % vegan[2]**

Europe 10 % ≡ 75 Million Veggies[3]

Worldwide 13 % ≡ 1 Milliarde Veggies[4]

Considering Veggy-Lifestyles of relevance especially for peer-groups of younger generations:

- **"Millenials" or "Generation Y" (young adults: 22 – 38 years) = key & main drivers!** for the global avoidance of meat & increased trend towards plant-based diets
- **25 % of 25 – 34 yr-aged in USA** refer to themselves as vegetarian or vegan
- **25 % der 18 yr-aged Brits** eat vegetarian or vegan
- **29 % of 11 – 18 yr-aged** want to reduce meat intake
- **30 % of 18 – 24 yr-aged Brits** have already considered to eat vegan or are already vegan
- **44 % of Generation Z (young people < 24) rate vegtearian-vegan Lifestyle as cooler than smoking**
- **1 out of 12 parents in the UK (8,3%** of 2.200) grow their children (0-12 yrs) vegan
  -> main reasons: (1) health benefits (61%) and (2) ethical reasons (35%)
- **Baby Boomers (1946-1964):** 29 % of US-population is at age 55+ (76 million) -> **increasing numbers are going vegan due to health** & animal welfare



It can be suggested that every social group (20 – 25 people) on average includes …

2 – 8 Vegetarians + 1 – 4 Vegans + 2 – 3 Allergics

-> highly relevant to health literacy & education (Curricula): elementary/primary up to Universitary level (lesons & lectures)

- ✓ Cross-cutting key competencies, 1 of the 2 UNESCO Learning Objectives for achieving the UN SDGs
- ✓ UN SDGs No. 3 & 4
- ✓ WHO Voluntary Global Target on NCDs No. 3

[1]STATISTA (2016), Swissveg (2017), Triconsult & Meinungsraum.at (2018), VEBU (2015/2016)
[2]Wedl Food Report (2017); [3]Heinrich Böll Stiftung, Fleischatlas (2014); [4]Planet Wissen.de (11/2016), du Toit et al (2016)

Quality of Diet & Nutrient Deficiency

"Alternative Healthy Eating Index"[1]

- Evaluation of nutrition & kinds of diet overall
- Rates vegetarian & vegan diets generally higher than mixed diet

"Healthy Eating Index 2010" und "Mediterranean Diet Score"[2]

- Highest scores for vegan diet calculated compared to …
- Mixed diet with lowest scores

In general:

- **Insufficient supply & deficiency of nutrients detected in ALL dietary patterns incl. mixed diet** (eg. iron, iodine, Vitamins D & B12)[3]
- **Therefore, vegetarian & vegan diets nutritionally not more/less deficient than any other kind of diet[4]**

Nutrient deficiency[5]	Mixed	Vegetarian	Vegan
Inadequate **daily intake considering Nutritional recommendations For … nutrients**	**6 – 7-times deficient:** *fiber* calcium *Iron* *folate* *copper* *iodine* magnesium *Vitamin C* Vitamin E *Vitamin B12 ?* *-> not checked!*	**3-times deficient:** calcium zinc Vitamin B12	**3-times deficient:** calcium iodine Vitamin B12 **Besser versorgt mit[6]:** beta-carotine Vitamin C Vitamin K Folate magnesium potassium fiber phytonutrients

[1]AND (2015, 2016), Barnard (2011, S. 79); [2]Clarys et al. (2014);
[3]AND (2016), Schüpbach et al. (2017), Wirnitzer (2018, S. 411); [4]McDougall & McDougall (2013)
[5]Greger (2018), Turner et al. (2014); [6]Leitzmann (2018, S. 102)

Animal Foods & Health?

Health threatening substances – residues repeatedly detected[1] …

92 % of Dioxins, Furane, PCBs from animal foods LM vs. 8 % from plant foods

- Meat, fish/seafood/seashell, milk/dairy products, eggs
- Highest impact from pesticides in meat & fish

Meat, processed meat, eggs, milk,cheese & dairy products

-> compacted from medication & pharmaceuticals in life-stock farming

- Antibiotics
- Hormones for increased growth, fertility, lactation
- Psychotropics & tranquillizer etc.

-> higher Pesticide levels (see animal feed from plants)

- 14-times higher in meat
- 5-times higher in milk

Fish, seafood & shellfisch: additionally Industrial toxins &heavy metals

- Million-times higher levels (lethal to humans) stored in flesh from eg. Dioxins, Furane, PCB`s, lead & mercury

Fazit: ratio of residues from animal vs. plant foods **…**

9:1 from medication, toxic substances & heavy metals
14:1 from pesticides

IARC Working Group, WHO (22 Experts/10 countries, > 800 studies)
Fazit: IARC Classification of Cancerogenity of red meat & processed meat

(1) Consumption of red meat: Group 2A – probably cancerogenic to humans
(2) Consumption of red meat processed meat: Group 1A – cancerogenic to humans

-> IARC classification for sausage, ham, Speck & Co. the same as for other causes for cancer, such as …

- ✓ **Smoking tobacco (nicotin)**
- ✓ **Asbestos**
- ✓ **Plutonium**

… in order to describe the strength of scientific evidence for a cause of cancer (not level of risk)

[1]Reggenstein (1982), Schweizer Bundesamt für Gesundheit (2013), WHO (2014);
[2]International Agency for Research on Cancer (IARC) Monograph Working Group et al. (2015);
IARC Working Group (2015), WHO (2015a+b), (Swissveg, 2016)

Background 2 Health

AND (2015/2016; formerly ADA) publishes Position Statements on vegetarian diets since 1980.

"… that appropriately planned vegetarian, including vegan, diets are healthful, nutritionally adequate, and …"

underlines & explicitly highlights (AND 2016):

… that "there are tremendous advantages toward prevention of chronic health conditions by adhering to a vegetarian eating pattern."

"These diets are appropriate for all stages of the life cycle,
including pregnancy, lactation, infancy, **childhood, adolescence,** older adulthood, and for athletes."

8 of the largest specialist associations for nutrition worldwide
agree about the benefits of well-planned and diligently implemented vegan (and vegetarian).[1]

PCRM recommends the vegan diet with the following rational:

„Vegan diets […] are even healthier than vegetarian diets.
… contain no cholesterol, even less fat, saturated fat and calories than vegetarian diets"
because free of dairy products and eggs.

„Scientific research shows that the health benefits increase as the amount of food from animal sources in the diet decreases, making vegan diets the healthiest overall."

[1] Academy of Nutrition and Dietetics (AND, 2015/2016); American Academy of Pediatrics (AAP, 2013); British Nutrition Foundation (BNF, 2005); Canadian Paediatric Society (CPS, 2010); Dietitians of Canada (DC; ADA, 2003; DC, 2014); Directorate-General of Health (DGH, 2015); National Health and Medical Research Council (NHMRC, 2013); Nordic Council of Ministers (2012; Nordic Co-operation of Denmark, Finland, Island, Norway, Sweden, Faroe Islands, Greenland and Åland); [2] PCRM (2018); www.pcrm.org/health/diets/vegdiets/healthiest-diet-is-one-focused-on-plants

Health Benefits: Prevention & Therapy

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REVIEW ARTICLE

Vegan Diet in Sports and Exercise, Health Benefits and Advantages to Athletes and Physically Active People: A Narrative Review

Katharina C Wirnitzer[1,2,3,4*]

https://clinmedjournals.org/articles/ijsem/international-journal-of-sports-and-exercise-medicine-ijsem-6-165.php

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Exercise capacity & performance

Fazit …

The healthy human *only*
is *the* foundation & pre-requisite
for the successful athlete!

Optimum basis fo better immune defense
-> maximum health
***The* foundation for peak performance in sport!**

-> less often sick & sick-leaves
-> training without sickness-related interruptions!

Only the healthy athlete
is able to effectively follow training schedule
& achieve performance!

Resting HR – Current Studies

After > 50 years consensus (in extracts)[2,3]

Distinct advantages from lifelong aerobic PA, Sports & Exercise

- **on cardiovascular & muscular health of 75 yr-olds (Ø 52 years, sports: 7 h/week at 5 days/week)**
- vs.to inactive seniors at the same age & to active 25 yr-olds

Improved cardio-respiratory fitness & health based on …

- ✓ **Healthy PA behavior, and**
- ✓ **Higher levels of sports & exercise**

In general:

Athletes have lower resting HR (≤ 60 bpm) compared to in-active people
<-> the lower the resting HR the better the fitness level[1]

Resting HR & premature mortality[1,4-6]:

- **Higher resting HR** more often results in premature death (see 16-yrs follow-up study)
  -> rather not an indicator for bad fitness but a **risk factor for overall mortality *INDEPENDENT* of fitness level & other cardiovascular factors**
- Every increment of 10 bpm in resting HR -> + 10 – 20 % risk for premature death
- **Resting HR > 65 bpm** with as strong **independent effect considering premature death**

Thus:

- ✓ **Lifelong reduction of resting HR from 70 down to 60 bpm** (reduced resting HR slows heart down: myocardial metabolic rate)
- ✓ **Increases lifespan for 13 years**

Resting HR & legumes[4]:

- Sports & exercise compared to consumption of beans & Co. in order to improve heart health due to lower resting HR
- It is evident that people benefit from their daily intake of legumes (= less sweaty &time consuming than sports)
- In sports = duale Approach best advice based on"Best Practice"
- **1 cup of legumes/day over 90 days** (lentils, chickpeas etc.)
  -> Reduction in resting HR (– 3.4 bpm) in the same extent as 250 h of running (treadmill)

[1]Jensen et al. (2013); [2]Meyers et al. (2015); [3]Gries et al. (2018); [4]Woodward et al. (2014); [5]Levine (1997), [6]Jenkins et al. (2012);

Sports & Health Benefits

Sports & Exercise offers *tremendeous advantages* & positive effects[1] …

Due to various mechanisms sports & exercise …

- ✓ Reduction of cardiovascular risk by improves blood pressure, tolerance of lipoprotein & glucose
- ✓ Improvement of cardiac, vascular, mechanic & metabolic function
- ✓ Improvement of hämostatic factors
- ✓ Positive effect on cancer risk by affecting BW

Other mechanisms with direct effects on …

- ✓ Organs (eg. capacity of heart & lung)
- ✓ and tissue (eg. elastic & capable muscles)

Various positive effects from regular Sports & Exercise (mainly Outdoors), especially on QOL, rate of morbidity & mortality, good physical fitness:[2]

- ✓ Naturally reduced & stabilizaton of BW
- ✓ Improved overall fitness & cardiovascular health (↓HF, ↑aerobic & anaerobic capacity)
- ✓ Reduction of muscular dysbalances
- ✓ Prevention from inactivity
- ✓ Preention from bad conditions considering health, social & psycho-somatic problems, pressure & stress
- ✓ Balancing everyday life
- ✓ Improved Q of sleep (calm, deep) & respiration (depth, oxygen use etc.)
- ✓ stable eating & drinking behavior incl. regular digestion
- ✓ Stable daily rhythm
- ✓ Improved psycho-social & cognitiv-intellectal capacities, cognitive performance (problem solving competence)
- ✓ Prevention of injury & accident due to better
  - Basic motoric capacities (strength, speed, endurance, reaction, flexibility, balance etc.)
  - coordination of movements for better motoric problem solving competence in everyday situations
  - Various & broad exercise experience -> huge repertoire & pool of exercise competences & movement actions
- ✓ Sports has positive effects on depression (see anti-depressent medication)

[1]Mora et al. (2006), Hambrecht et a. (2000), McTiernan (2008); [2]Jungreithmayr (2010b), Wirnitzer (2015/2018), Kvam et al. (2016), Knechtle & Quaralla (1994)

Advantages to Athletes

Consens[1-4]: Lifestyle factors & main pillars of health (1) diet, and (2) Sports & Exercise …

- Have a high impact on heart health & resting HR -> therefore pronounced influence on cardiovascular health
- Meaning: **changes in personal lifestyle effectively reduced resting HR**
- Fazit:
  - In order to be as **slim & fit like non-active vegans <-> omnivores have to run 2 marathons/week over 21 yrs**
  - Approx. **1.600 km/yr of running has same positive health effect as being non-active vegan**

[1]Fontana et al. (2007);
[2]Murakami et al. (2005);
[3]Wirnitzer (2018, S. 390-391);
[4]Wirnitzer (2020)


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Formula – *refined* ‚Super'-Medicine

Dating back to ancient times: food and PA, sports & exercise considered Medicine
consensus: both lifestyle factors <-> positive health effects[1-4]
Dual guidelines since 2002[5]

Daily moderate PA, Sports & Exercise[6] = Medicine

+ Plant-based Diets[7] = Medicine

‚Healthy eating – Active living' = ‚*Super*'-Medicine

Okinawa as good role-model <-> but might *not* be the upper boudary!

-> shaping sustainable & lifelong health:

easy, safe, low-cost & effective to sustainable health

Individual Health → Public Health

[1]AND (2015, 2016), Deriemaeker et al. (2010, 2011) Key et al. (2006); [2]Gries et al. (2018), Myers et al. (2015); [3]Turner-McGrievy et al. (2016), Wilson (2016); [4]Diehl et al. (2012); [5]IOM (2005), OECD (2015a+b); [6]Jeukendrup (2018): https://twitter.com/jeukendrup/status/849548949216268288 (28.3.2018), Khan et al. (2012); [7]Greger (2017, S. 23), Oberbeil & Lentz (2015, S. 9–14, 38, 100), PCRM (2018): www.pcrm.org/health/diets/vegdiets/frequently-asked-questions-about-nutrition#RecommendVegDiet; [8]Tuso et al. (2013a)

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Closing the Circle

Transfer Science ↔ Public

Current state of scientific evicence/sound that[1] ….
- ✓ PA, sports & exercise = beneficial to health
- ✓ vegan diets = beneficial to health

Consensus that benefits & positive effects on health emerge from …

'Healthy Eating – Active Living'[2,3]

Minimum recommendation based on 2 main pillars of sustainable health

Dual Approach for sustainable Health[2,3]

Vision of ,*Super*'-Medicine

-> Thus: can be basis of a good state of

Personal/individual Health → Public Health/Health of Nations

Action-oriented health competence & sustainable actions
<-> competence-oriented health education & literacy

[1]Leitzmann (2018, S. 123), Wirnitzer (2018, 2020); [2]AND (2015, 2016), PCRM (2018), Wirnitzer (2018, 2019, 2020), AHS 1 & 2, GEICO etc.; [3]Tuso et al. (2013a)

Prevention 1st

HOW can this Dual Approach to health & longevity …

- **… be applied to & put into practice/action?** <-> even in specialized physicians & therapists (-> patients)
- **… be integrated within proven concepts to add benefits from cumulative health effects?** <-> therapy, to heal & cure
- **… be delivered to general public & bring change from social units & levels** <-> motivate decision makers
- **… improve public health by individual health**

Prevention first!

"Inherited" Habits: childhood into old age

Since behavior & habits track over time -> Starting soon in childhood[1]

- **Starting with education soon in childhood[1]**
  - ✓ Family (micro unit)
  - ✓ Kindergarden
  - ✓ **School -> up to University/Highschool**: introductory lectures at specialized studies focusing on health …
    - Primary & Family Care Medicine & other health care professions
    - Health & Life Sciences
- **Simultaneous application of healthy behavior, e.g. school sports, school buffet/canteen**
- **recommended to health experts, desicion makers & multipliers**
  … this safe, effective & low-cost tool to implement in everyday scenarios
  - ✓ in politics, science, health care system & statutory insurance groups
  - ✓ education system (state mandate) & and **encourages families, teachers** and principals
  - ✓ Rolemodels & idols, eg. stars (actors, singers, athletes)

[1]Leitzmann (2018, S. 123), Wirnitzer (2018, 2019, 2020)

Secondary school curriculum

Stand: 2018

Curricula: State educational mandate - overarching educational goal

Education Sector No. 5 „Health and Physical Activity“

Health as an overarching educational goal

Center of a sustainable teaching-learning process

competence- and action-oriented implementation in all compulsory subjects

concerning **holistic health concept** contribution to the health & movement-promoting life organization make …

… by dealing with **health topics such as nutrition**, …

Health Promotion

… is one of the highest learning goals of didactic interventions

… **primarily special task of school sports**

-> Compulsory subject PE „Physical Education” has “LEADING role“

-> according to curricula: PE is compulsory subject

(kein Nebenfach, Lernfach o.Ä.)

Lehrplan AHS Unterstufe (Sekundarstufe I) (AHS, 2018a) Inkraftretungsdatum: 9. Jänner 2018. Anlage A: Erster Teil. Allgemeines Bildungsziel, Punkt 5. Bildungsbereiche. Gesundheit und Bewegung. Seite 10. http://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=BundesnormenundGesetzesnummer=10008568 (1. Juni 2020).

Lehrplan AHS Oberstufe (Sekundarstufe II) (AHS, 2018b) Inkraftretungsdatum: 9. Jänner 2018. Anlage D: Erster Teil. Allgemeines Bildungsziel, Punkt 5. Bildungsbereiche. Gesundheit und Bewegung. Seite 10. http://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=BundesnormenundGesetzesnummer=10008568 (1. Juni 2020).

Lehrplan der Neuen Mittelschule (NMS, 2018). Inkraftretungsdatum: 1. September 2018. Anlage 1: Erster Teil. Allgemeines Bildungsziel, Punkt 5. Bildungsbereiche. Gesundheit und Bewegung. Seite 5. Sowie: Sechster Teil. Lehrpläne der einzelnen Unterrichtsgegenstände. Pflichtgegenstand Bewegung und Sport. Beiträge zu Bildungsbereichen. Seite 102. https://www.ris.bka.gv.at/Dokumente/Bundesnormen/NOR40199276/NOR40199276.pdf (1. Juni 2020)

Primary school curriculum

Stand: 2012

EDUCATION & TEACHING TASKS of the compulsory subjects (pp. 18, 41-42, 88, 220 ff.)

Health & Health Education as a teaching principle

„The meaning of the own health learn to recognize & health-conscious behavior initiate."

DIDACTICAL PRINCIPLES compulsory subject PE „Physical Education" (pp. 77, 78, 220)

… should be performed **outdoors as often as possible**

… **even under unfavorable spatial conditions daily movement unit & health effective movement time**

EDUCATION & TEACHING TASK compulsory subject PE „Physical Education" (pp. 75, 77, 78, 197 ff)

Task of PA, Sports & Exercise as well as compulsory subject PE …

Maintaining health and improving performance special importance

considering **sustainable health education**

the **development of a comprehensive movement & sport-related action competence**

Acquisition of subject-specific as well as **interdisciplinary abilities, skills & attitudes** (6 areas of experience & learning)

Area of experience and learning (5) Healthy Living (pp. 200 ff.):

Exercise promotes physical, mental and social **well-being,** by which

a **significant contribution to health in a holistic sense** is achieved.

… build up **important resources for strengthening health**

There is no subject,

that does as much for other subjects as sport.

– Sabine Sabinarz-Otte, Federal Parents' Council Germany

PE in „Leading Role"

The healthy human *only*

is *the* foundation & pre-requisite

for the a sustainable healthy & happy life!

Dual Approach for sustainable Health as minimum recommendation

– Public Health by Individual Health of Pupils through Healthy Lifestyle

School health promotion as education, teaching & research mandate

Big Picture

PART 1 – Background -> Dual Approach 2 Health

PART 2 – Food = Medicine

PART 3 – Exercise = Medicine

PART 4 – Lessons 2 be learned

PART 5 – Work in Progress & Future Perspective

Work in Progress

To date little is known about[1-5] …

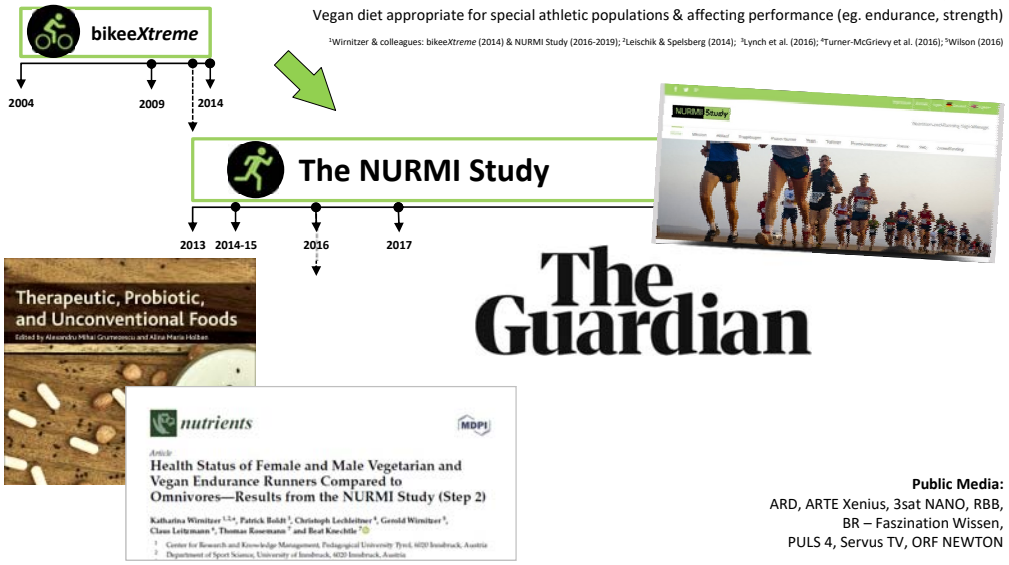
Health & health-related behavior of vegetarian & vegan sports populations

Vegan diet appropriate for special athletic populations & affecting performance (eg. endurance, strength)

[1]Wirnitzer & colleagues: bikee*Xtreme* (2014) & NURMI Study (2016-2019); [2]Leischik & Spelsberg (2014); [3]Lynch et al. (2016); [4]Turner-McGrievy et al. (2016); [5]Wilson (2016)


Energy and macronutrient intake of a female vegan cyclist during an 8-day mountain bike stage race

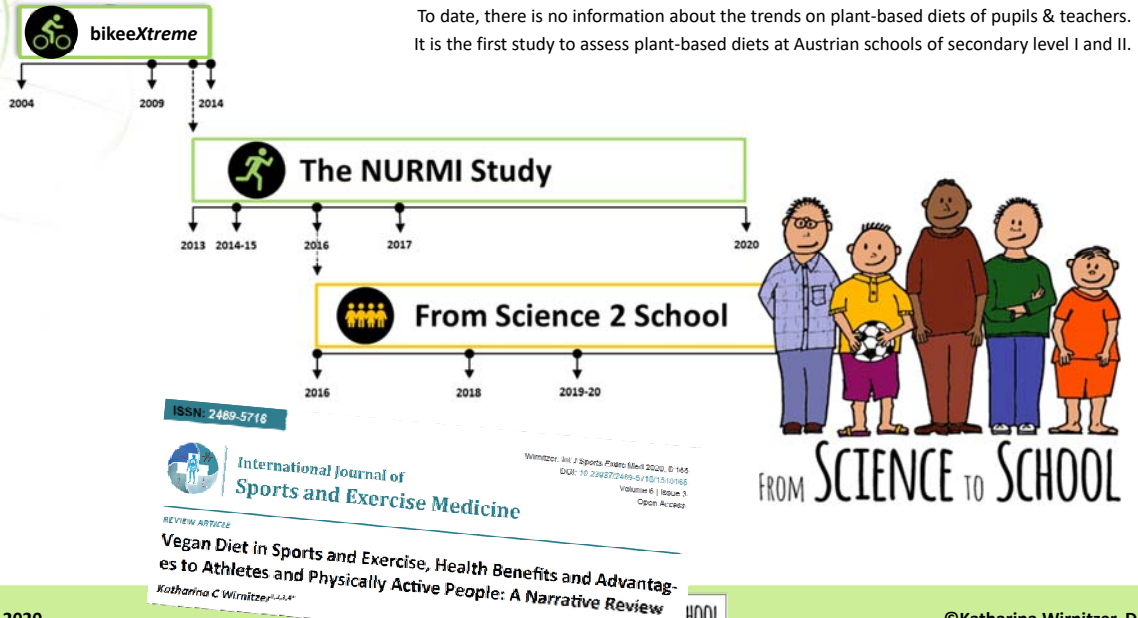
Katharina C. Wirnitzer, Dr. rer. nat., and Elmar Kornexl, Univ.-Prof.



Public Media:
ARD, ARTE Xenius, 3sat NANO, RBB,
BR – Faszination Wissen,
PULS 4, Servus TV, ORF NEWTON

Work in Progress

To date, there is no information about the trends on plant-based diets of pupils & teachers.
It is the first study to assess plant-based diets at Austrian schools of secondary level I and II.



FROM SCIENCE TO SCHOOL

From Science 2 School: Sustainably healthy – active & veggy

Survey of the prevalence of vegetarian diets linked to sports & physical exercise
among Austrian pupils, teachers and principals of secondary levels I and II

8,845 pupils or **1.1 % of total sample**
1,350 adults or **1.5 % of total sample**

July 2020: https://www.science2.school/#Fragebogen

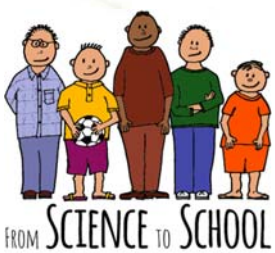
Work in Progress

Background …

- **Healthier lifestyles in childhood track into adulthood.**
- **Better public health emerges from improved pupils' health <->**

  … crucial to start health-related education early: kindergarten -> university

  … and offering healthy options at the same time



Health is one of the major topics for human development & the future in education, matching …

- ✓ **UN "Sustainable Development Goals" No. 3 "Good Health and Well-Being" & No. 4 "Quality Education"**
- ✓ **WHO Voluntary Global Target on NCDs, particularly No. 3 „ […] 10% […] reduction in […] insufficient PA"**
- ✓ **UNESCO Learning Objective "Cross-cutting key competencies" (1 out of 2)**
  to achieve the UN SDGs, aimed to help educators & policymakers to integrate these into education & curricula

Work in Progress

Aim 1

- **Prevalence of vegetarian, vegan, omnivorous diet linked to PA levels at school**
- **Investigate health behavior of school children at secondary level 1 & 2, nationwide AUT**
- **From the current data -> transfer** of findings to health-orientated actions
  to improve health of nations by better personal HS **<-> start in childhood/adolescence**

This school study …

… will provide an important contribution to overcome the lack of information about plant-based diets linked to sport & exercise in Austrian schools.

The findings can help to …

(1) justify the need to consider this basic dual approach
as a highly effective, safe and low-cost intervention to contribute improving pupils' health

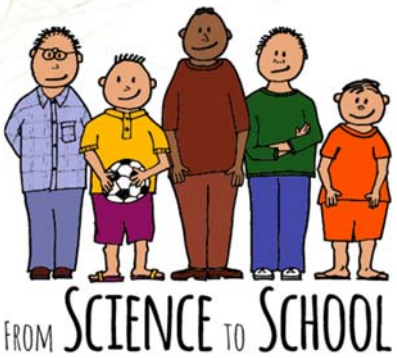
(2) encourage decision makers in education to put this simple approach into action in everyday school scenarios
(eg. the canteen and catering, interdisciplinary events),
such as federal/governmental authorities, principals, teachers & families

(3) develop health-orientated action competence & sustainable action readiness
relating to pupils' health through competence-orientated education

NURMI Study FROM SCIENCE TO SCHOOL

Work in Progress

From Science 2 School: Sustainably healthy – active & veggy



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universität innsbruck
Institut für Sportwissenschaft

iteg
IT Engineers GmbH

Life & Health Science Cluster Tirol

pht
PÄDAGOGISCHE HOCHSCHULE TIROL

Gefördert von tirol

Think big!

HOW can this be realized in everyday scenarios?

Team up & think big!

Potential solutions to start (in extracts) may be …

- based on scientific evidence -> put into proven concepts
- **competence-orientated curricula & education in health literacy**
  -> health competencies <-> implemented in curricula starting with kindergarten, schools & up to Universities
- From micro units to meso/federal & macro/governmental levels,
  eg. families & local communities, family & primary medical care, principals & politicians
- etc.

Follow-up Studies

Science 2 School, AT

Science 2 School, EU

Science 2 HS & Uni, AT

Science 2 HS & Uni, EU

„Global Health Paradox“
Scientific Research Exchange & Meetings
(1) ISW, Innsbruck (6. Feb 2020)
(2) MUG, Graz (10. – 11. Nov 2020)

Basic/major references (4. Feb 2020):
NHS – Nurses Health Study 1-2 (2017: 40 years) & NHS 3 (2016) – new recruitment (total: 2,526 hits)
HPFS – Health Professionals Study & Follow-up Studies (total: 195 hits)
WHO HBSC Study (since 1994/for 30 years, 4-yr-frequency): http://www.hbsc.org/ (total: 244 hits)

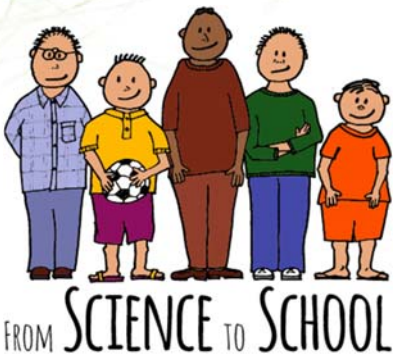
Follow-ups: Geographical Approach

FROM SCIENCE TO SCHOOL

	AT	Europe/EU	Global
From Science 2 School *(see SH4GH)*	X	X	
From Science 2 Highschool & University	X	X	*(X)*
School Health 4 Global Health *(see S2S, S2HS)*			X

Follow-ups: Basic Study Design

From Science 2 School: Sustainably healthy – active & veggy



FROM SCIENCE TO SCHOOL

Methods:

Quantitativ – cross sectional (descriptiv-vergleichend): online-survey

From Science 2 School: nation-wide AT

From Science 2 School: Europe-wide, EU

Follow-ups: Refined Study Design

Methods:

Quantitativ – cross sectional (descriptiv-vergleichend): online-survey

From Science 2 Highschool/Uni, nation-wide AT

From Science 2 Highschool/Uni, Europe-wide, EU

Aim 2

- **Prevalence of mixed, vegetarian, vegan diet linked to PA level/sports & exercise**
- investigate **health behavior of students, lecturers, researchers** & Highschool/Univ. staff
- Reflection of data & transfer of findings into health-orientated measures & actions at tertiary educational insitutions, eg. entrenchment at curricula, or buffet, canteen, etc.

International 2-day online-meeting:

Tue & Wed, Nov 10-11, 2020
Save the date!

Improving Child & Adolescent Health for better Public Health – Fiction or within the scope of possibility?

Brief outline with preliminary program:
www.science2.school/en/invitation-improving-child-adolescent-health-for-better-public-health/

More than 120 Researchers from 56 Universities/Organizations around the world and cross-cutting disciplines & research interests are invited.

FROM SCIENCE TO SCHOOL

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Life & Health Science Cluster Tirol, Subcluster Health/Medicine/Psychology, THK