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ALUMNI 23 MAART 2022

HET BELANG VAN SPORT BIJ GEZONDE EN CHRONISCH ZIEKE KINDEREN: EXERCISE IS MEDICINE !

Kristof Vandekerckhove

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BELANG VAN SPORT BIJ GEZONDE KINDEREN

Kristof Vandekerckhove

FYSIEKE FITHEID

health

skills

muscular strength

hand-eye coördination

balance

aerobic exercise capacity

body composition

power

speed

flexibility

physical development

emotional development

cardiometabolic risk

psychosocial development

neurological functioning

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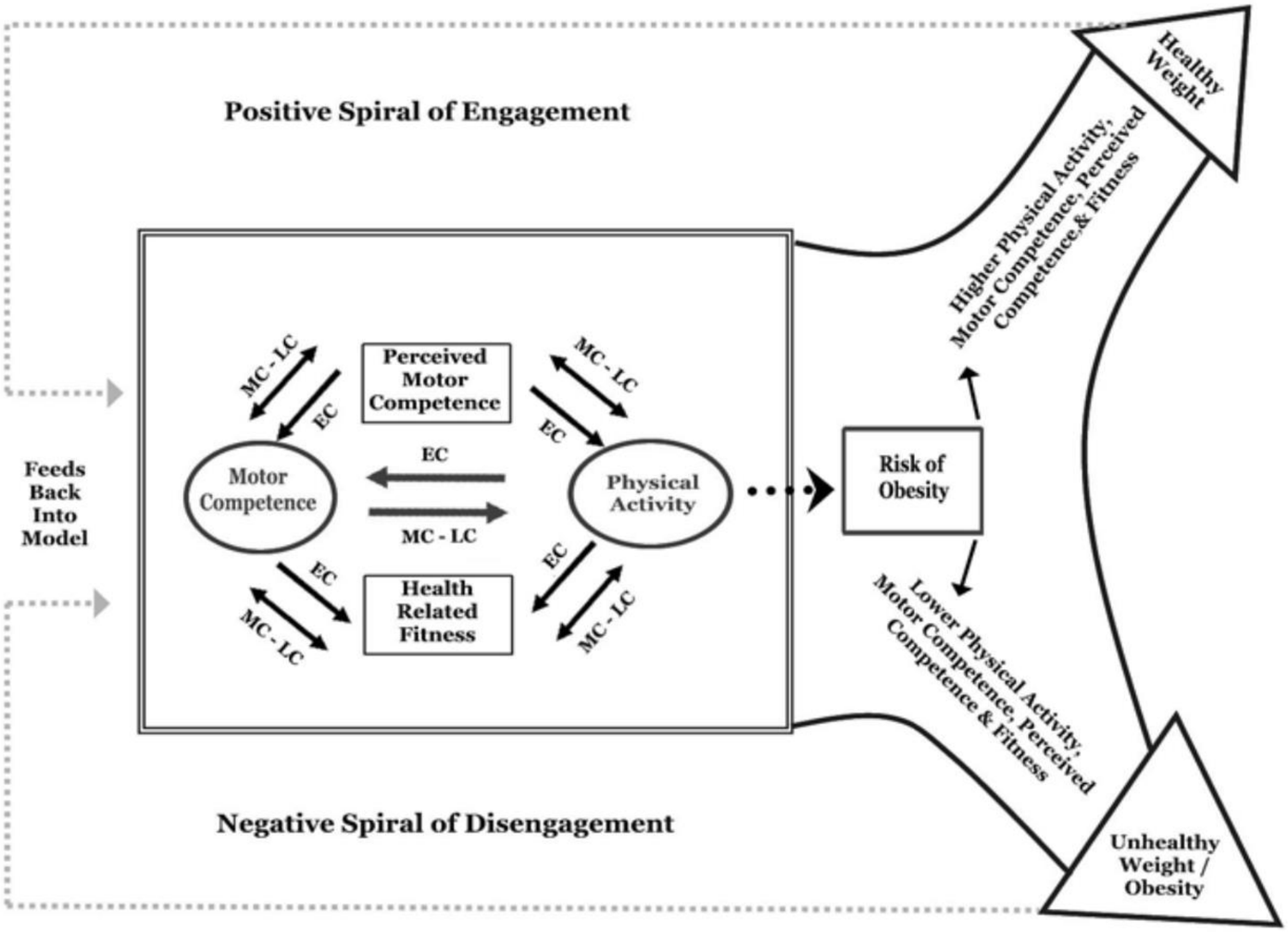
MOTOR COMPETENCE – PHYSICAL ACTIVITY



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MOTOR COMPETENCE – PHYSICAL ACTIVITY

Leeftijdsafhankelijkheid:

Kinderleeftijd:

fysieke activiteit ⟶ motorische competentie

Adolescentie:

motorische competentie ⟶ fysieke activiteit

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Review

Effects of physical activity on executive functions, attention and academic performance in preadolescent children: a meta-analysis

Johannes W. de Greeff[a,*], Roel J. Bosker[b,c], Jaap Oosterlaan[d], Chris Visscher[a], E. Hartman[a]

5. Conclusions

Based on the results of the current meta-analysis positive effects were found for both acute physical activity as well as for longitudinal physical activity programs on cognitive functions (in the current study a combined effect of the domains executive functions, attention and academic performance) in preadolescent children. The positive effects of acute physical activity were only found for attention, while the positive effects of longitudinal physical activity programs were consistent for all domains. The results indicate that benefits are largest for continuous cognitively engaging physical activity over several weeks.

Implicaties:

- Fysieke activiteit stimuleert aandacht
- Interventieprogramma's die fysieke activiteiten bevatten stimuleren executieve functies, performantie
- Interventieprogramma's stimuleren cognitieve functies

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RESEARCH ARTICLE

Physical fitness in preschool children in relation to later body composition at first grade in school

Kirkke Reisberg[1,2]*, **Eva-Maria Riso**[1], **Jaak Jürimäe**[1]

Better PF status in kindegarten will be transmitted towards more favourable changes in body composition at school, expressed by generally lower BMI, FMI, FM% and WHtR among children who are predominantly in normal weight range. Compared to other PF tests, the improvements in 4x10 m shuttle run test results during the 12-month follow-up period were linked to healthy body composition status the most, being the only test that was related to greater FFMI alongside with many other beneficial associations.

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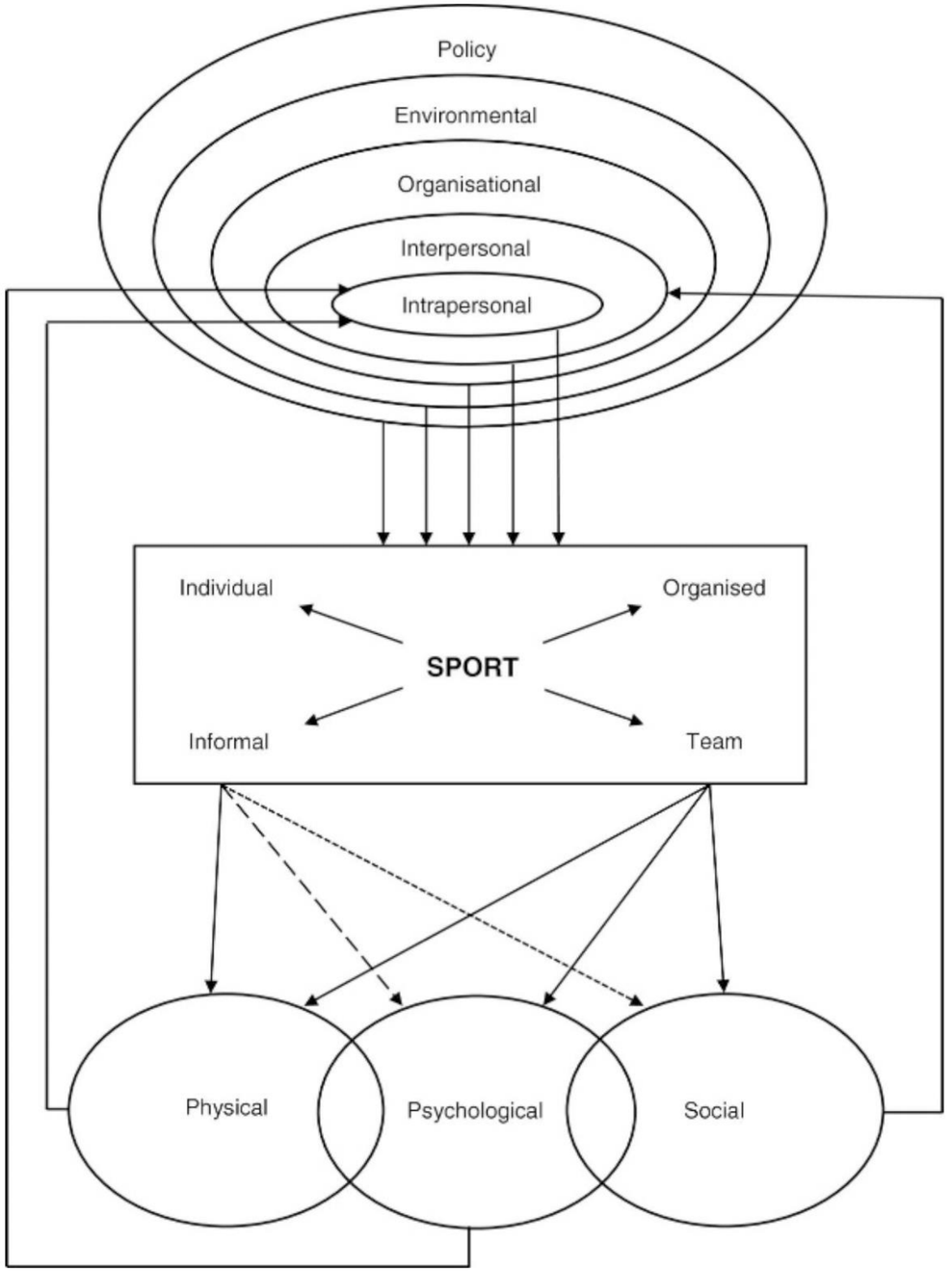

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Figure 1. A conceptual model of Health through Sport. Source: Eime, et al. [22].

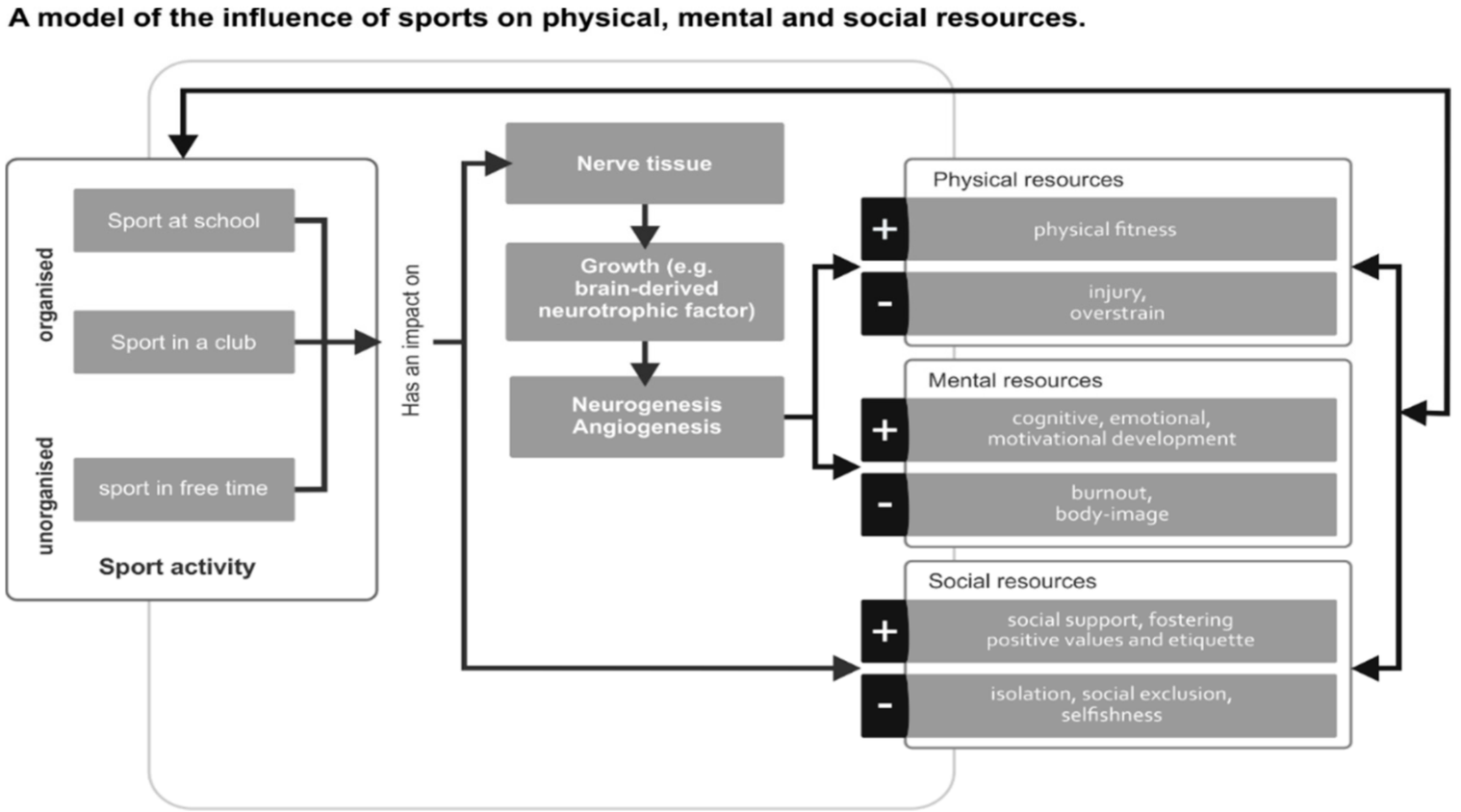

Figure 2. A model of the influence of sport on physical, mental, and social resources. The model was developed by the authors based on: McMorris, et al. [49], Diehl, et al. [71].

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Combinations of physical activity, sedentary time, and sleep duration and their associations with depressive symptoms and other mental health problems in children and adolescents: a systematic review

Conclusions

We systematically reviewed studies that looked at combinations of physical activity, sedentary time, and sleep duration with depressive symptoms and other mental health indicators among children and adolescents. Our review provides supporting evidence that adherence to the 24-h movement guidelines for children and adolescents is associated with better mental health status. These findings underscore the need to encourage children and adolescents to meet the 24-h movement guidelines. It is important that all stakeholders including parents, schools, caregivers, health professionals, policymakers, and children and adolescents themselves be informed about the potential benefits of adherence to the 24-h movement guidelines. However, the available evidence is of very low quality (using the GRADE framework), as it relies heavily on cross-sectional studies using self-reported measures of physical activity, screen time, and sleep duration. Higher quality research is desired to better determine whether a dose-response gradient exists between the number of movement behaviour recommendations met and mental health to better support the 24-h guideline paradigm.

Role of Physical Activity and Sedentary Behavior in the Mental Health of Preschoolers, Children and Adolescents: A Systematic Review and Meta-Analysis

Key Points
Physical activity interventions have a small positive effect on mental health in adolescents; however, well-designed intervention studies are needed to confirm these findings.
The majority of studies in this review involved adolescent populations; therefore, future research should focus on preschoolers and children.
Observational evidence suggests that promoting physical activity and decreasing sedentary behavior might support mental health in children and adolescents. Additional studies answering the questions *when, where, what, how much* and *with whom* are needed to better understand the relationship between physical activity, sedentary behavior and mental health in young people.

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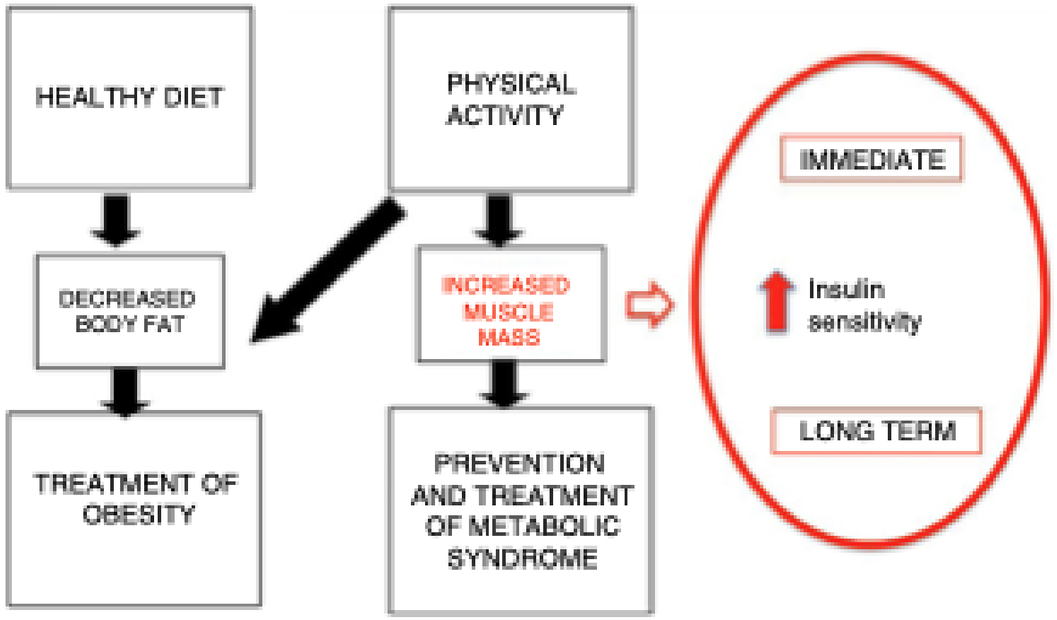
FYSIEKE FITHEID
EN
OBESITEIT OP KINDERLEEFTIJD



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SEDENTAIR GEDRAG

Contents lists available at ScienceDirect

Canadian Journal of Diabetes

journal homepage: www.canadianjournalofdiabetes.com

Review

Sedentary Behaviour as an Emerging Risk Factor for Cardiometabolic Diseases in Children and Youth

Travis J. Saunders MSc, PhD [a,b,*], Jean-Philippe Chaput PhD [a,b], Mark S. Tremblay PhD [a,b]

[a] Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario Research Institute, Ottawa, Ontario, Canada
[b] School of Human Kinetics, University of Ottawa, Ottawa, Ontario, Canada

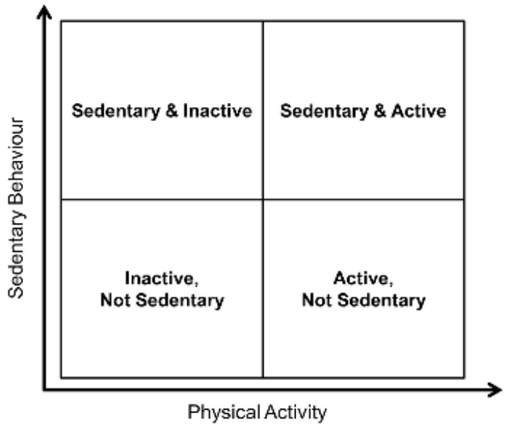

Figure 1. Sedentary behaviour and physical activity as distinct constructs.

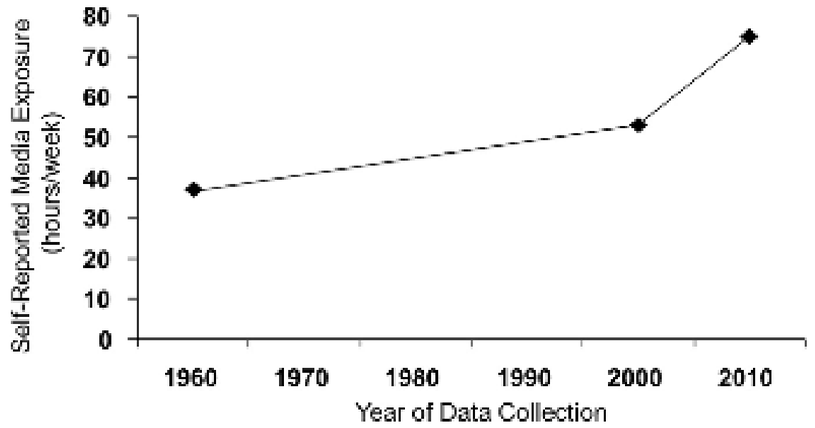

Figure 2. Self-reported media exposure of American youth over time. Data from Schramm et al (48) and Rideout et al (49). Data have not been adjusted for multi-tasking (e.g. engaging with multiple media simultaneously).

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FYSIEKE FITHEID INVLOED OP KINDERLEEFTIJD

Body composition, fat mass and bone health
- Increased daily energy expenditure
- Improved fitness: improved agility, sharper reflexes, increased speed and greater endurance
- Modulates the production of hormones and the regulation of hunger.
- Increases muscle mass. Hypertrophy, increased oxygen consumption.
- Decrease in fat mass and the risk of obesity, useful in both the prevention and treatment of obesity.
- Lowered risk of comorbidities associated with obesity.
- Increase in bone mass and bone mineral density, decreasing the risk of osteoporosis

Cardiovascular risk
- Improvements in cardiorespiratory fitness and metabolism.
- Improvements in atherogenic lipid profile (increase in HDL cholesterol levels and decrease in triglyceride levels).
- Decreased insulin resistance (prevents diabetes and decreases insulin requirements in diabetic individuals).

Mental health and attitude towards life
- Protects from the adverse effects of sedentary behaviours.
- Boosts self-esteem and mood (reduces anxiety and depression).
- Improves social integration. (Promotes compliance with rules, valuing and engaging in teamwork, integrating and taking on responsibilities, and reduces the tendency to develop aggressive traits).
- Improves the management of the underlying disease.
- Boosts academic performance.
- Can contribute to the prevention of smoking initiation in children and adolescents.

Improves aspects of health and contributes to clinical improvement in patients with the following:
- Motor impairment.
- Disorders with hypotonia.
- Diseases with cardiorespiratory involvement.
- Asthma.
- Cancer.
- Depression.
- Other

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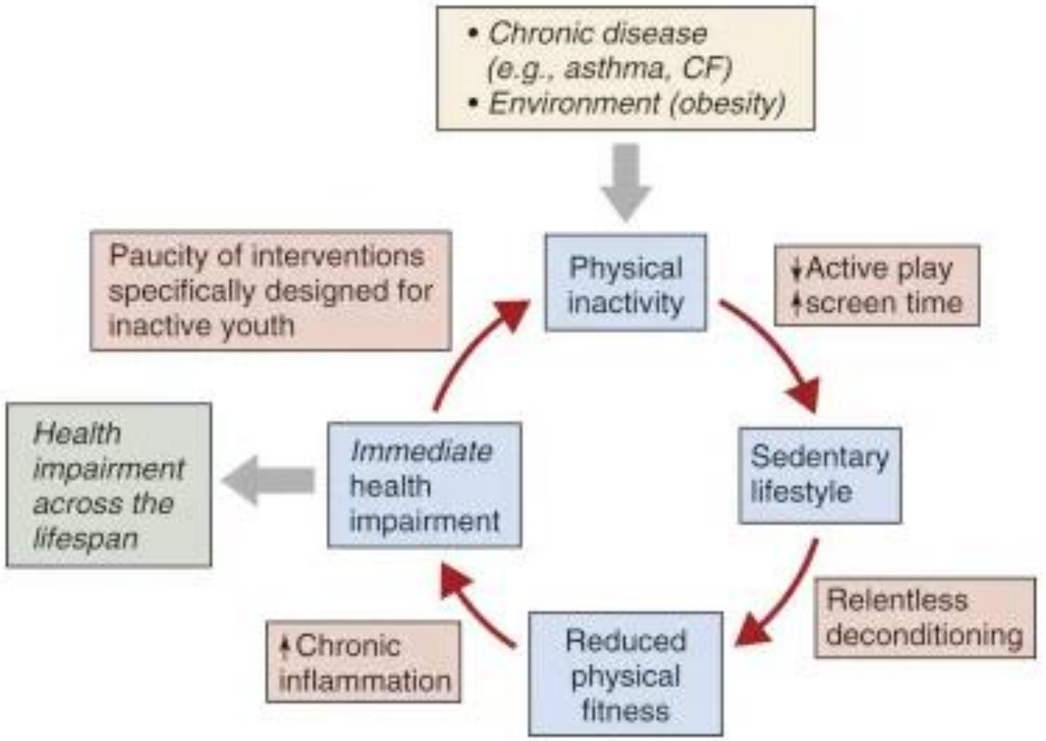
VICIEUZE CIRKEL FA, FF EN SG OP KINDERLEEFTIJD



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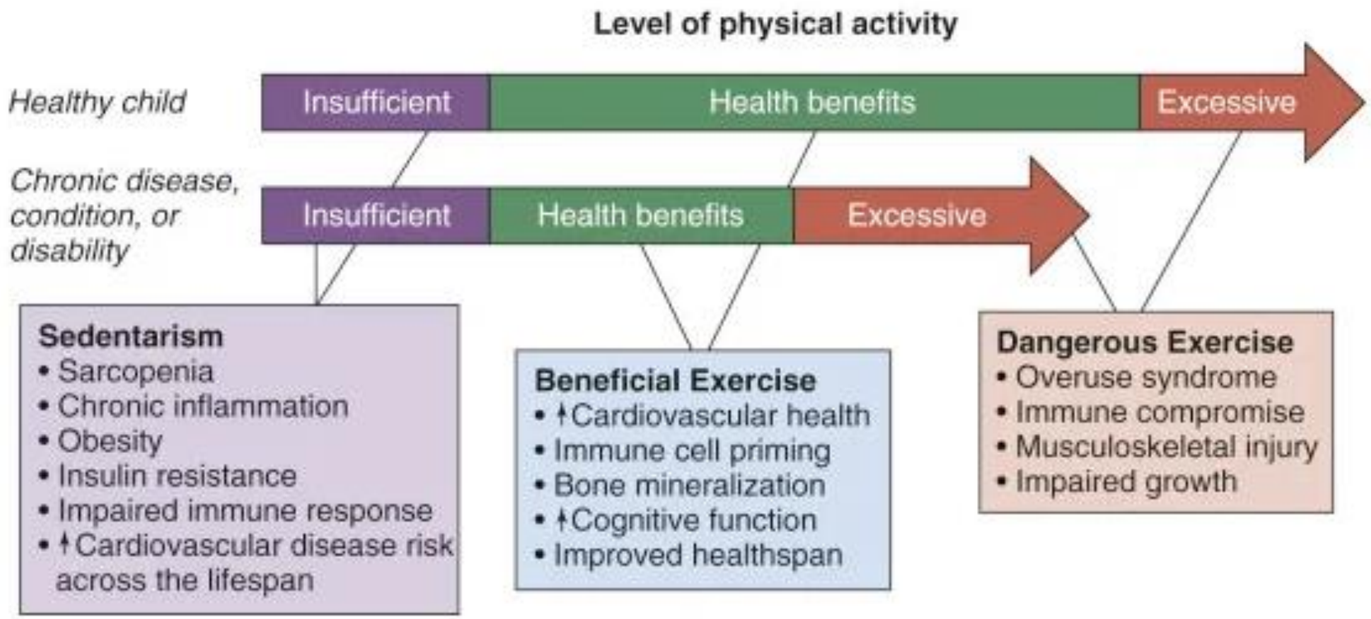
VICIEUZE CIRKEL FA, FF EN SG OP KINDERLEEFTIJD



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FA, HEALTH RELATED FF EN HEALTH

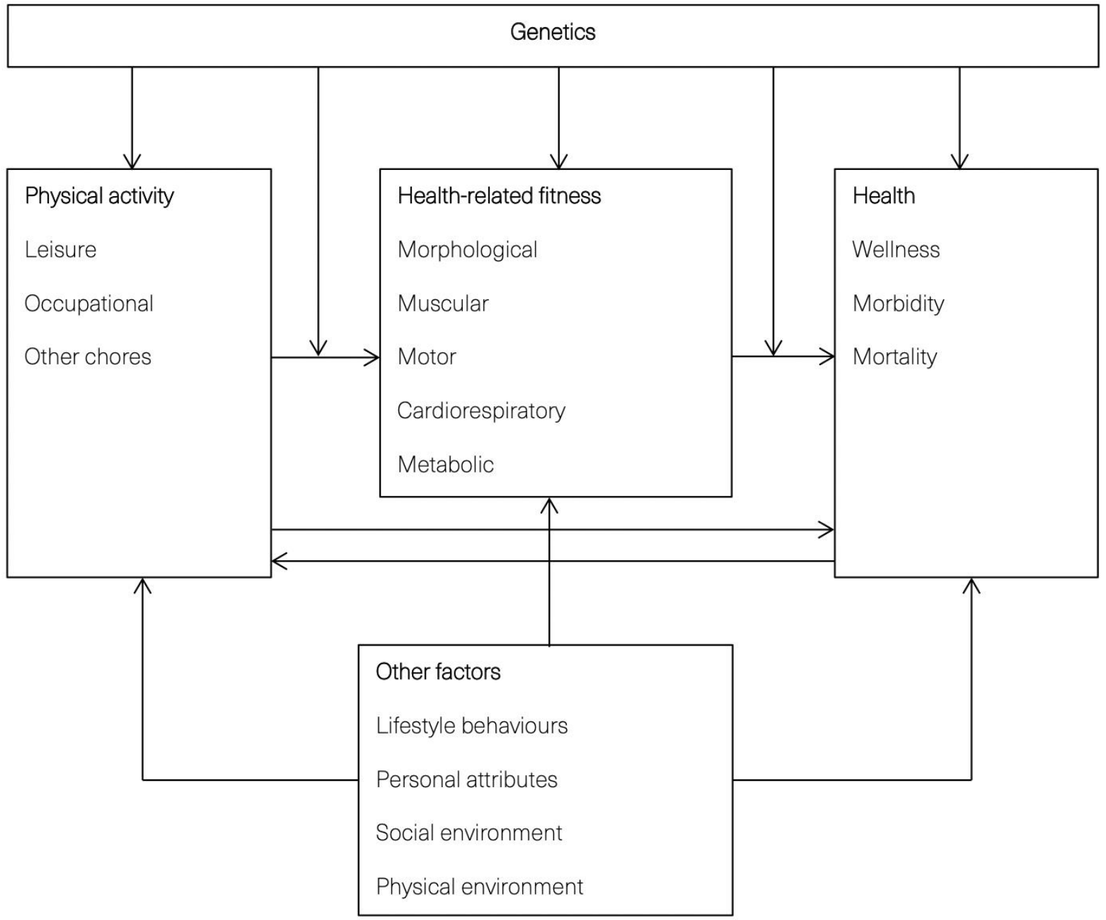

Figure 1. Associations between physical activity, health-related fitness and health (model according to Bouchard[27]).

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HOE PROMOTEN?

FITT – principle

Table 4. General recommendations following the FITT principle for physical activity participation and exercise training in healthy children and adolescents

FITT	Cardiovascular (aerobic) training	Interval training	Muscle strength (resistance) training
Frequency	≥3 times/week	≥3 times/week	2–3 times/week
Intensity	Moderate-to-heavy exercise ($\dot{V}O_{2peak}$ 40−85%)	3–5 min of light-to-moderate baseline exercise ($\dot{V}O_{2peak}$ 20 to 59%) interrupted 6–8 times by 1–3 min bouts of very intense exercise ($\dot{V}O_{2peak}$ >85%)	High (50–70% MVC)
Time	20–60 min	In total 20–60 min	2–3 min per muscle group (about 8–20 repetitions), in total ≥30 min
Type	Running, jumping, cycling, swimming, football	Running, jumping, cycling, swimming	Push-ups, sit-ups/crunches, pull-ups, handgrips, squats, climbing, martial arts, rowing

MVC, maximal voluntary contraction; VO_2, oxygen uptake or oxygen consumption; Interval training can be used alternatively with aerobic training in healthy children.[9]

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WHO GUIDELINES

WHO GUIDELINES ON **PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOUR**

It is recommended that:

› **Children and adolescents should do at least an average of 60 minutes per day of moderate- to vigorous-intensity, mostly aerobic, physical activity, across the week.**

Strong recommendation, moderate certainty evidence

At least 60 minutes a day

moderate- to vigorous-intensity physical activity across the week; most of this physical activity should be aerobic.

› **Vigorous-intensity aerobic activities, as well as those that strengthen muscle and bone, should be incorporated at least 3 days a week.**

Strong recommendation, moderate certainty evidence

On at least 3 days a week

vigorous-intensity aerobic activities, as well as those that **strengthen muscle and bone** should be incorporated.

GOOD PRACTICE STATEMENTS

- Doing some physical activity is better than doing none.
- If children and adolescents are not meeting the recommendations, doing some physical activity will benefit their health.
- Children and adolescents should start by doing small amounts of physical activity, and gradually increase the frequency, intensity and duration over time.
- It is important to provide all children and adolescents with safe and equitable opportunities, and encouragement, to participate in physical activities that are enjoyable, offer variety, and are appropriate for their age and ability.

It is recommended that:

› **Children and adolescents should limit the amount of time spent being sedentary, particularly the amount of recreational screen time.**

Strong recommendation, low certainty evidence

LIMIT

the amount of time spent being sedentary, particularly recreational screen time.

Executive summary

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WHO GUIDELINES

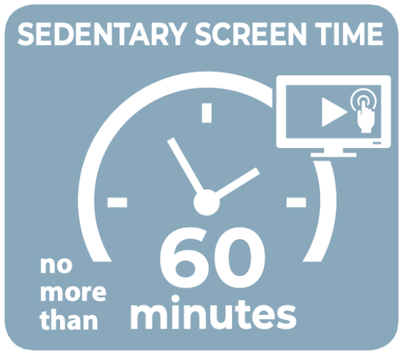
GUIDELINES ON **PHYSICAL ACTIVITY, SEDENTARY BEHAVIOUR AND SLEEP** | FOR CHILDREN UNDER 5 YEARS OF AGE

children 3–4 years of age should:

Spend at least 180 minutes in a variety of types of physical activities at any intensity, of which at least 60 minutes is moderate- to vigorous-intensity physical activity, spread throughout the day; more is better.

Not be restrained for more than 1 hour at a time (e.g. prams/strollers) or sit for extended periods of time. **Sedentary screen time should be no more than 1 hour; less is better.** When sedentary, engaging in reading and storytelling with a caregiver is encouraged.

Have 10–13 hours of good quality sleep, which may include a nap, with regular sleep and wake-up times.



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WHO GUIDELINES

PHYSICAL ACTIVITY

RECOMMENDATIONS

- **Infants (less than 1 year)**
  should be physically active several times a day in a variety of ways, particularly through interactive floor-based play; more is better. For those not yet mobile, this includes at least 30 minutes in prone position (tummy time) spread throughout the day while awake.
- **Children 1–2 years of age**
  should spend at least 180 minutes in a variety of physical activities at any intensity, including moderate- to vigorous-intensity physical activity, spread throughout the day; more is better.
- **Children 3–4 years of age**
  should spend at least 180 minutes in a variety of physical activities at any intensity, of which at least 60 minutes is moderate- to vigorous-intensity physical activity, spread throughout the day; more is better.

Strong recommendations, very low quality evidence

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BELANG VAN SPORT BIJ CHRONISCH ZIEKE KINDEREN

Kristof Vandekerckhove

FYSIEKE FITHEID BIJ CHRONISCHE ZIEKTE

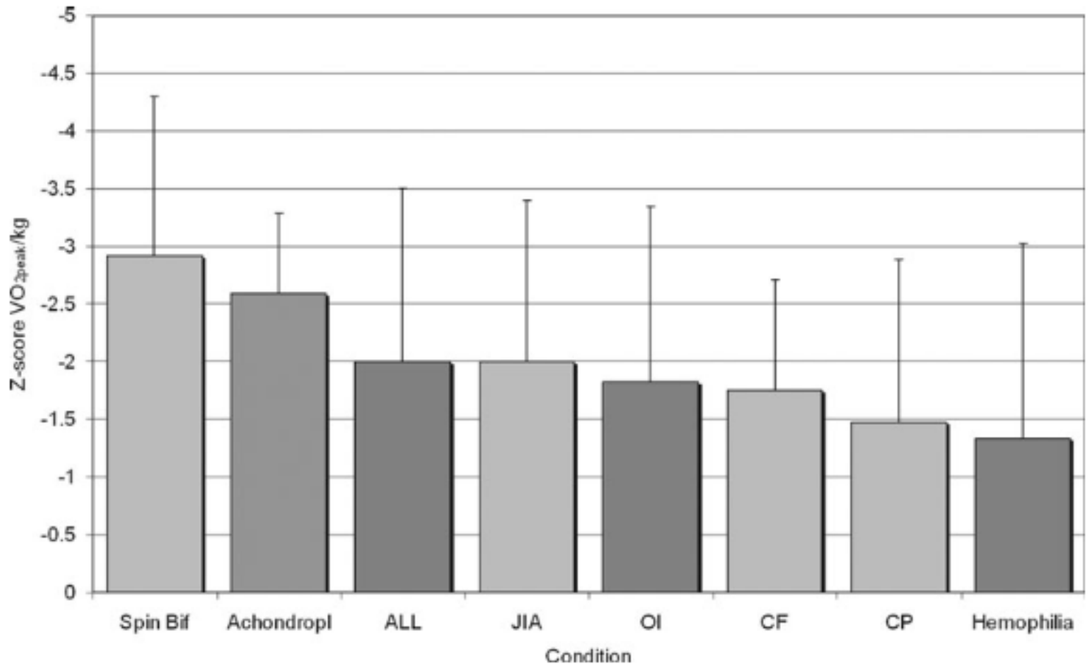

Fig. 1. Observed levels of aerobic capacity (expressed in *Z* scores of Vo_{2peak}/kg) from several studies from our group. Data obtained from references 10, 15, 21, 28, 41, 53, 64, and 74. For details about the populations, we refer the reader to the original publications.

van Brussel, M., van der Net, J., Hulzebos, E., Helders, P. J., & Takken, T. (2011). The Utrecht approach to exercise in chronic childhood conditions: the decade in review. *Pediatr Phys Ther, 23*(1), 2-14. doi:10.1097/PEP.0b013e318208cb22

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SG en chronische ziekte: weinig onderzoek…

Accelerometer measured levels of moderate-to-vigorous intensity physical activity and sedentary time in children and adolescents with chronic disease: A systematic review and meta-analysis

Rabha Elmesmari, John J. Reilly, Anne Martin, James Y. Paton

Published: June 22, 2017 • https://doi.org/10.1371/journal.pone.0179429

Conclusions

In summary, this systematic review found that overall (habitual) MVPA levels are well below international recommendations in at least some groups of children and adolescents with chronic childhood diseases. The present review suggests that management of pediatric chronic conditions should place greater emphasis on MVPA, and patients with at least some chronic diseases are probably not currently benefiting from the health and non-health benefits that MVPA can bring. Time spent sedentary is often higher than in the comparison groups, and probably too high in many patients, but this is difficult to interpret in the absence of health-related recommendations for accelerometer measured ST in children and adolescents. This valuable information about the MVPA and ST levels in children with chronic disease may help to stimulate improving PA guidelines, and improving PA for these children. The need for more extensive research in this area, including intervention studies of the impact of increased MVPA levels on health related outcomes, is clear.

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RATIONALE

- Fysieke activiteit op jonge leeftijd → gezondheidsstatus op jonge leeftijd
- Fysieke activiteit op jonge leeftijd → fysieke activiteit op volwassen leeftijd
- Fysieke actviteit op jonge leeftijd → gezondheidsstatus op volwassen leefijd

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“PEDIATRIC INACTIVITY TRIADE”

- “exercise deficit disorder” : Levels van matig tot ernstige FA: onvoldoende = evenwaardige risicofactor (zoals BD, roken,…)

- “Pedatric dynapenia” : lage levels van spiersterkte en kracht, niet gerelateerd aan de ziekte : vaker inactief, vaker letsels

- “fysische illiteracy” : gebrek aan vertrouwen, comptetentie, motivatie en kennis

PROBLEEMSTELLING

- WHO: richtlijnen voor gezonde kinderen
- Concrete richtlijnen bij chronische ziekte: afwezig
- Clinici blijven onzeker ivm FA
  - Risico’s en benefits afwegen
  - Hoeveelheid FA in functie van
    - Type ziekte
    - Ernst, gezondheidsstatus en fitheid

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RATIONALE

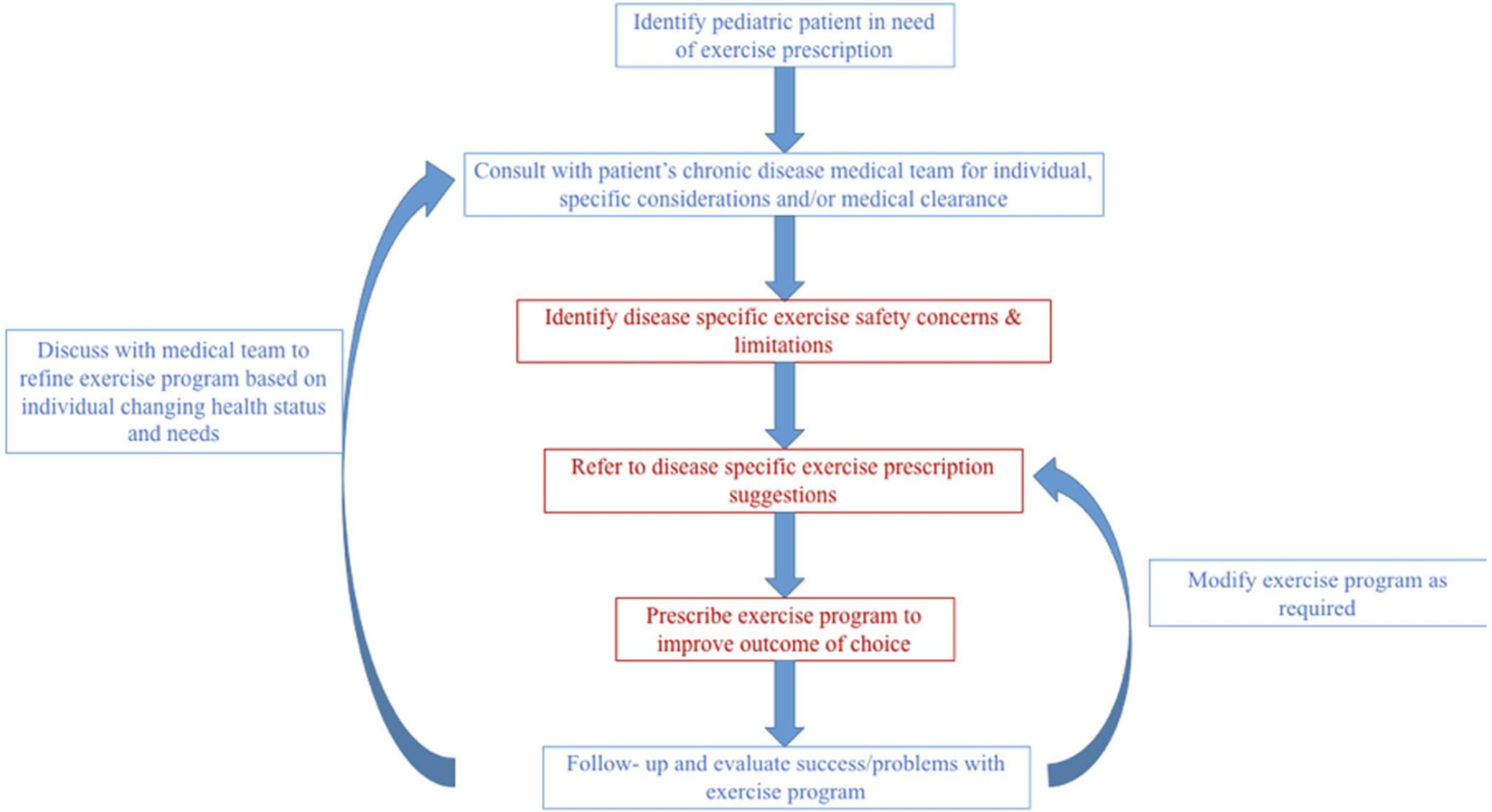

Fig. 1 Flow chart of the use exercise as medicine and current suggestions for pediatric chronic disease. Legend: Red text identifies steps in the process that the current narrative reivew may help inform

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EXERCISE IS MEDICINE

SPECIFIC PEDIATRIC CONDITIONS

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CYSTIC FIBROSIS

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PATHOGENESIS

- Autosomaal dominant
- 1/2500 – 1/4000
- Abnormale expressie van CF transmembrane conduction regulator protein
- Productie van dikker mucus
- Verschillende orgaansystemen zijn betrokken (resp, GI)

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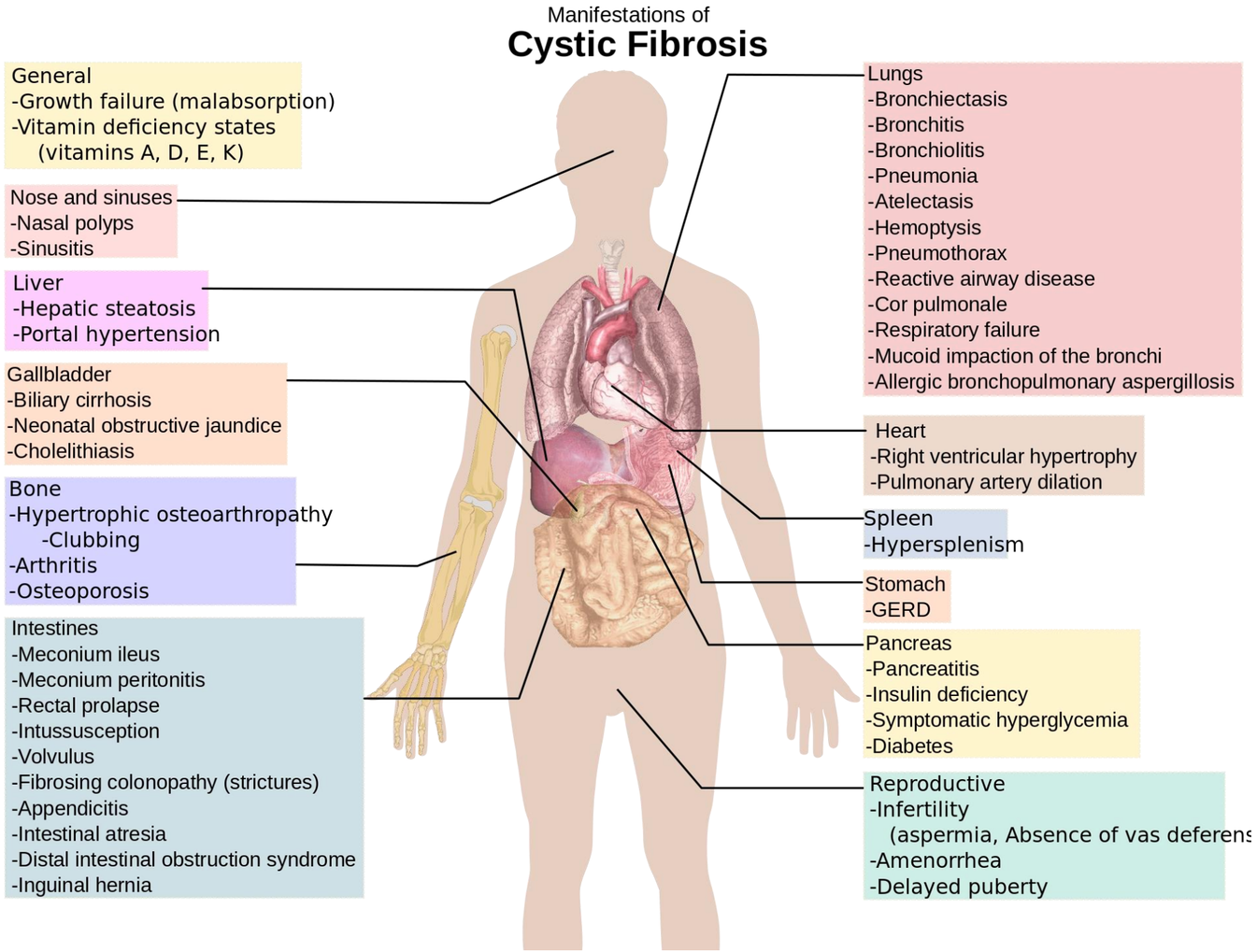
PATHOGENESIS



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PATHOGENESE VAN INSPANNINGSVERMINDERING

- respiratoir (longfunctie)
- cardiaal
- perifere spieren
- productie van dikker mucus
- verminderde nutritionele status

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PATHOGENESE VAN INSPANNINGSVERMINDERING BIJ CF

- Verhoogde dode ruimte, vergroting van ventilatie bij inspanning
- Verhoogde ademarbeid geeft verminderde bloeddoorstroming van de perifere spieren
- Zuurstofsaturatie daling
- verminderde nutritionele status

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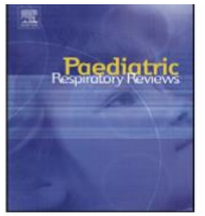
PATHOGENESE VAN INSPANNINGSVERMINDERING BIJ CF

- Mild tot matig – RV cardiol functievermindering (syst-diast)
- Microvasculaire veranderingen -> spierdoorboeding
- Lagere ATP/PCr levels thv spier: mismatch
- Spieratrofie (inflamm cytokines, nutritioneel)

Contents lists available at SciVerse ScienceDirect

Paediatric Respiratory Reviews



MINI-SYMPOSIUM: Optimising Cystic Fibrosis Outcomes: Screening and Treating in 2013

The evolution of exercise capacity and its limiting factors in Cystic Fibrosis

Athari Almajed, Larry C. Lands *

Division of Pediatric Respiratory Medicine, Department of Pdiatrics, Montreal Children's Hospital-McGill University Health Centre, 2300 Tupper Street, Room D380, Montreal, Québec, Canada, H3H 1P3

Respiratory Factors Contributing to Exercise Limitation in CF

Expiratory airflow limitation
Hypoxemia due to:
Ventilation-perfusion mismatch
Excessive deadspace ventilation
Increased work of breathing due to:
Increased airflow resistance
Decreased lung compliance
Airtrapping and dynamic hyperinflation
Respiratory muscle inefficiency and weakness

Peripheral Skeletal Muscle and Physical Activity Factors Contributing to Exercise Limitation in Cystic Fibrosis

Low muscle mass
Deconditioning causing increased carbon dioxide production due to:
Increased glycolysis
Decreased fat utilization
Increased lactate appearance and decreased lactate clearance
CFTR mutations
Arterial hypoxemia and low oxygen delivery
Medications
Corticosteroids, anti-rejection therapies
Andropause
Decreased moderate to vigorous activity

Cardiac Factors Contributing to Exercise Limitation in Cystic Fibrosis

Left ventricular dysfunction
Right ventricular dysfunction
Low stroke volume
Left and right ventricular dysfunction
Malnutrition
Myocardial fibrosis resulting from:
Diabetes
Systemic inflammation
Increased aldosterone and angiotensin II
CFTR mutations
Pulmonary hypertension and cardiopulmonary interaction resulting in:
Low cardiac output
Hypoxemia
Low oxygen delivery

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ADVIEZEN BIJ CF PATIENTS

- Bij start : CPET
  - HR max, zuurstofsaturatie, bronchospasme, respons op behandeling
- Aandachtspunten:
  - Inspanning bij warmte
  - Electrolieten/vocht replacement na inspanning
  - Bij ernstige CF: monitor O2-sat
  - Opgelet in fitness: overdracht/ contaminatie

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PRACTISCHE ADVIEZEN BIJ CF PATIENTS

- Aeroob (Cardio-resp)
  - Oefening op 70% -> verbetert longfunctie : aerobe capaciteit: mininum 2x per week
- Anaeroob
  - Anaerobe oefeningen met voldoende rust positief
- Weerstandstraining
  - Veilig, best body-weight exercises
  - Echte “weight” training : gelimiteerd en onder supervisie
- Flexibiliteit en mobiliteit
  - Yoga ++
  - Mentale en fysieke benefits
  - Chest stretching

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ASTHMA BIJ KINDEREN

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PATHOGENESE

- Chronische inflammatie van de LW
- Globale prevalentie tot 14%
- Jongens >> jongere leeftijd; meisjes >> oudere leeftijd
- Allergisch vs. Niet allergisch; bronchoconstrictie door >< oorzaken
- “EIBC” exercise induced bronchoconstrictie
  - “Water-verlies” hypothese
  - “Thermisch” – cooling van de LW bij sporten, “rewarming” uitlokkend
- Behandeling
  - short-acting bronchodilatator
  - high intensity of variabele intensity warm-up
  - Controlleren van triggers: vermijden koude-droge lucht

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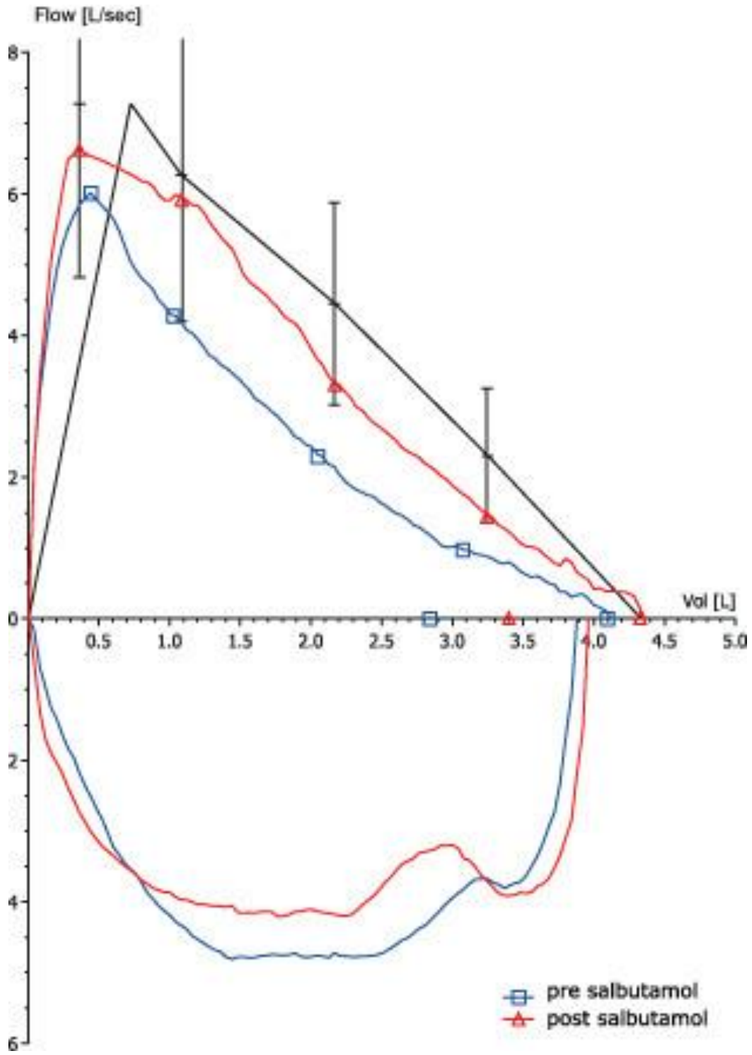
PATHOGENESE



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RISICOFACTOREN VOOR MORBIDITEIT EN MORTALITEIT BIJ KINDERASTHMA

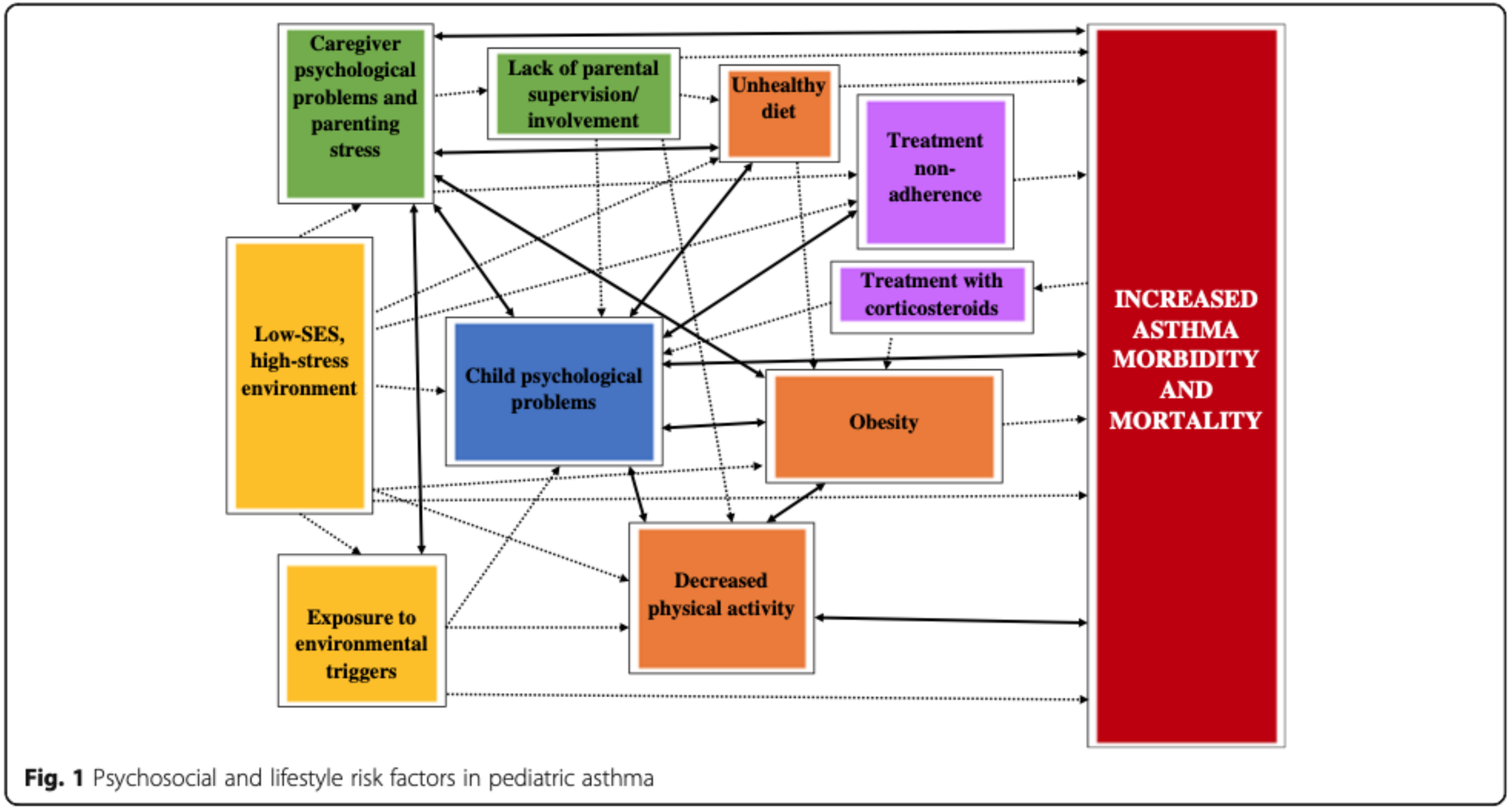

Fig. 1 Psychosocial and lifestyle risk factors in pediatric asthma

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NOCHTANS…

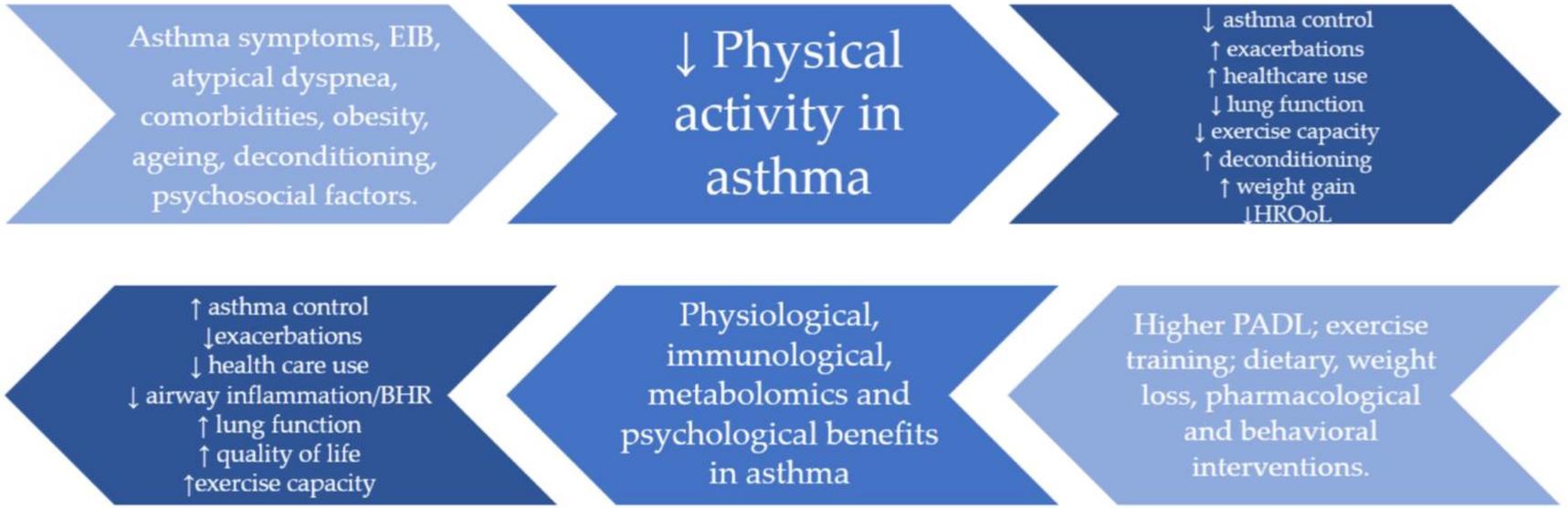
Review

Physical Activity: A Missing Link in Asthma Care

Marios Panagiotou *, Nikolaos G. Koulouris and Nikoletta Rovina

1st Deptartment of Respiratory Medicine, National and Kapodistrian University of Athens, Sotiria Thoracic Diseases General Hospital, 115 27 Athens, Greece; koulnik@med.uoa.gr (N.G.K.); nikrovina@med.uoa.gr (N.R.)

* Correspondence: mpanagiotou@med.uoa.gr



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INSPANNING BIJ ASTHMA

- Asthma controle -> mogelijk ook bij ernstige vormen
- Angst voor uitgelokte bronchoconstrictie (EIBC)
- Regelmatige inspanning verbetert asthma symptomen
  - Minder hospitalisaties
  - Minder gebruik van medicatie
  - Minder bronchiale reactiviteit
  - Betere QOL
- Modus:
  - Vb zwemmen beter dan buiten in de koude
- Intensiteit:
  - Lage intensiteit, ventilatie recovery: veiliger (vb HIIT)

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PRAKTISCHE ADVIEZEN BIJ ASTHMA BIJ KINDEREN

- Geen guidelines
- Maken van “asthma action plan”
  - Warming up
  - Bronchodilator use
  - Management of additional triggers
    (koude, masker,…)

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PRAKTISCHE ADVIEZEN BIJ ASTHMA BIJ KINDEREN

- Aeroob:
  - Gebruik van medicatie 60 min voor PA
  - Bij deconditionering: laag intensiteit, korte duur
- Anaeroob:
  - Intermittent, HIIT, herstel toelaten
- Weerstandstraining:
  - Onderdeel bij vnl gedeconditioneerde kinderen
  - Vb 2-3 x per week, niet opeenvolgende dagen
- Flexibiliteit en mobiliteit
  - Veilig, onwaarschijnlijk uitlokkend
  - Benefits niet bewezen.

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AANGEBOREN HARTAFWIJKINGEN

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PATHOGENESE

- 8/1000 pasgeborenen
- Zeer divers spectrum
  - Kleinere afwijkingen tot zware afwijkingen
  - Vb VSD vs. Eenkamerhart
- Overleving enorm verbeterd : 90% ernstige hartafwijkingen overleven
- Complexe chirurgie

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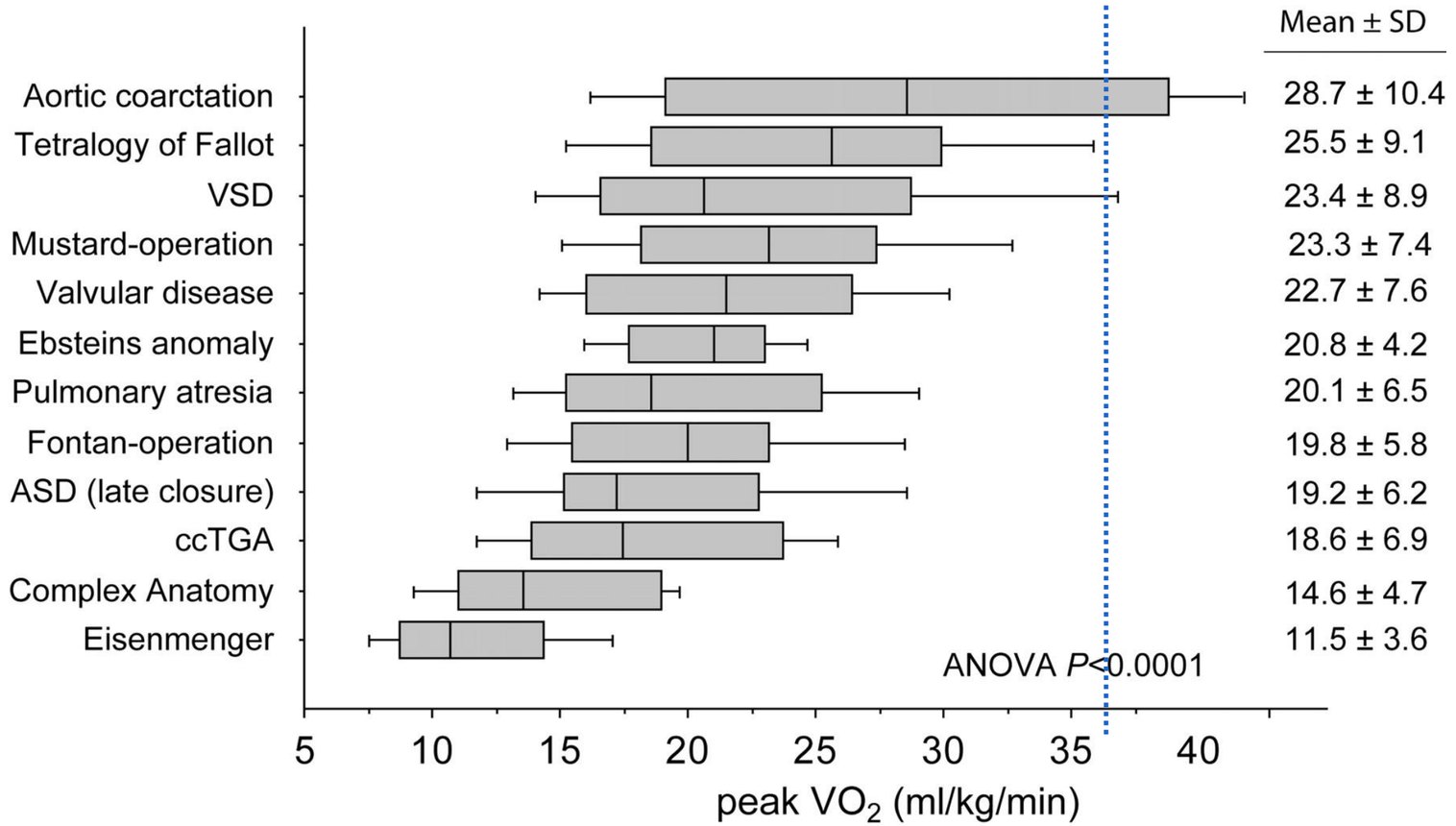
INSPANNINGSVERMOGEN BIJ CHD



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MOTORISCHE VAARDIGHEDEN BIJ CHD

Holm, I., Fredriksen, P. M., Fosdahl, M. A., Olstad, M., & Vollestad, N. (2007). Impaired motor competence in school-aged children with complex congenital heart disease. *Arch Pediatr Adolesc Med, 161*(10), 945-950. doi:10.1001/archpedi.161.10.945

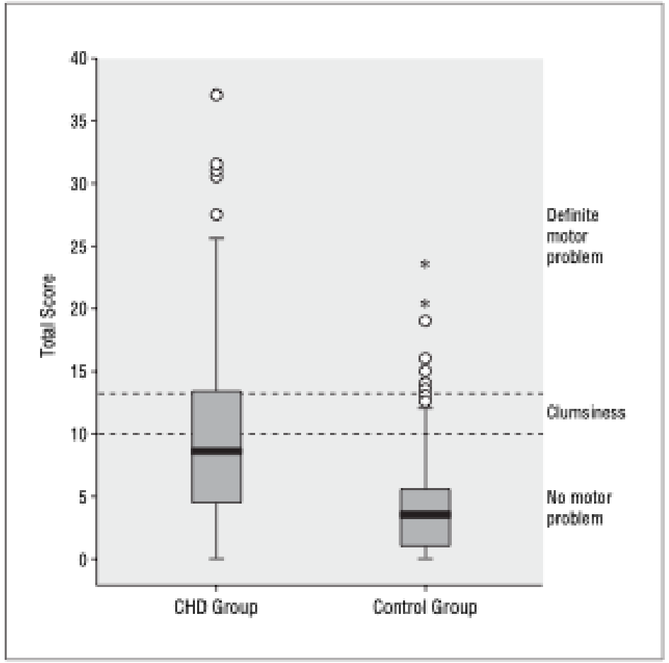

Figure. Distribution of the Movement Assessment Battery for Children total score for children with congenital heart disease (CHD) (n=120) and healthy age- and sex-matched children (n=385). The box length contains 50% of the cases. Asterisks indicate extremes; circles, outliers; thick horizontal line in each box, median value; limit lines, highest and lowest values (except for the outliers and extremes); and dashed lines, the 5th and 15th percentiles (13.5 and 10.0 points, respectively).

Table 1. Mean Outcome Values and Differences Between Groups for the Movement ABC Total Score and Subscores

Assessment (Range of Scores)	Mean (SD [95% CI]) Score: Children With CHD (n=120)	Mean (SD [95% CI]) Score: Age- and Sex-Matched Healthy Children (n=385)	Mean Differences Between Groups (95% CI)[a]
Total Movement ABC score (0-40)	10.0 (7.7 [0-37])	4.0 (3.7 [0-23.5])	5.9 (5-7.0)
Manual dexterity (0-15)	4.3 (4.0 [0-15])	2.1 (2.6 [0-15])	2.2 (1.6-2.8)
Ball skills (0-10)	2.4 (2.4 [0-10])	0.9 (1.5 [0-10])	1.5 (1.1-1.9)
Static/dynamic balance (0-15)	3.3 (3.6 [0-15])	1.0 (1.7 [0-15])	2.2 (1.7-2.7)

Abbreviations: CHD, congenital heart disease; CI, confidence interval; Movement ABC, Movement Assessment Battery for Children.
[a]The mean differences between groups were statistically significant for all assessments ($P<.001$ for all comparisons).

Table 2. Mean Outcome Values and Differences Between Groups for Strength and Balance

Assessments	Mean (SD [95% CI]) Value: Children With CHD (n=120)	Mean (SD [95% CI]) Value: Age- and Sex-Matched Healthy Children (n=387)	Mean Differences Between Groups (95% CI)[a]
Quadriceps strength, Nm	219 (106.3) [52 to 514]	278.8 (112.6) [76-706]	−59.7 (−83 to −36)
Grip strength, N	145.3 (47.4) [39.2 to 274.7]	176.6 (51.2) [58.9 to 372.8]	−31.3 (−44 to −21)
Static balance index	592 (302) [245 to 1803]	464 (193) [170 to 1363]	127.5 (81 to 174)

Abbreviations: CHD, congenital heart disease; CI, confidence interval; Nm, Newton meters.
[a]The mean differences between groups were statistically significant for all assessments ($P<.001$ for all comparisons).

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INSPANNINGSVERMOGEN BIJ CHD : MECHANISMEN VAN LAGER INSPANNINGSVERMOGEN

Chronotrope incompetentie : autonome dysfunctie

Residuel letsels (klepstenose, rest VSD, …)

Verminderde hartfunctie: slagvolume

systolisch: contractie

diastolisch: relaxatie

Deconditionering

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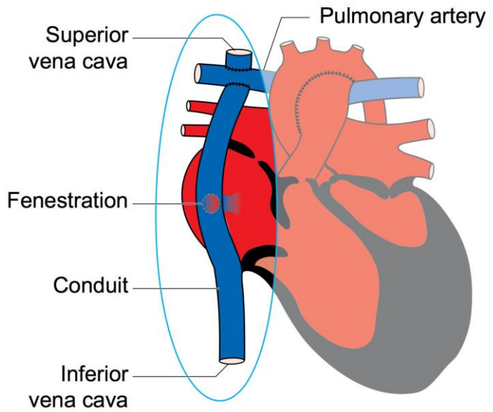
INSPANNINGSVERMOGEN IN CHD : INTERPRETATIE: UNIVENTRICULAIR HART

	Fontan	Controls	p-value
Ppeak (Watt)	73 ± 19	99.8 ± 18.0	P<0.001*
Ppeak/kg (Watt.kg^{-1})	1.89 ± 0.35	3.24 ± 0.60	P<0.001*
VO_2peak (ml.min-1)	1091 ± 309	1795 ± 791	P<0.001
VO_2peak/kg (ml.min^{-1}.kg^{-1})	28.9 ± 7.9	46.3 ± 11.9	P<0.001
% PredVO_2peak	68.3 ± 20.2	114.0 ± 17.1	P<0.001
HRpeak (bts.min^{-1})	168 ± 13	193 ± 12	P<0.001
VO_2 at GET (ml.min^{-1})	648.1±173.6	863.9±306.8	P=0.015
GET% (ml.min^{-1}.kg^{-1})	60.5±11.24	46.3±8.6	P<0.001
Load at GET(Watt)	33.4±11.7	44.5±25.12	P=0.103
VEmax (ml.min^{-1})	41.2±10.1	64.4±26.7	P=0.002
VE/VCO_2 slope	34.5±5.9	27.1±3.9	P<0.001
OUES	1331.3±385.8	1987.5±696.9	P=0.004



Vandekerckhove, K., Coomans, I., Moerman, A., Panzer, J., De Groote, K., De Wilde, H., . . . Boone, J. (2019). Differences in cerebral and muscle oxygenation patterns during exercise in children with univentricular heart after Fontan operation compared to healthy peers. *Int J Cardiol, 290*, 86-92. doi:10.1016/j.ijcard.2019.05.040

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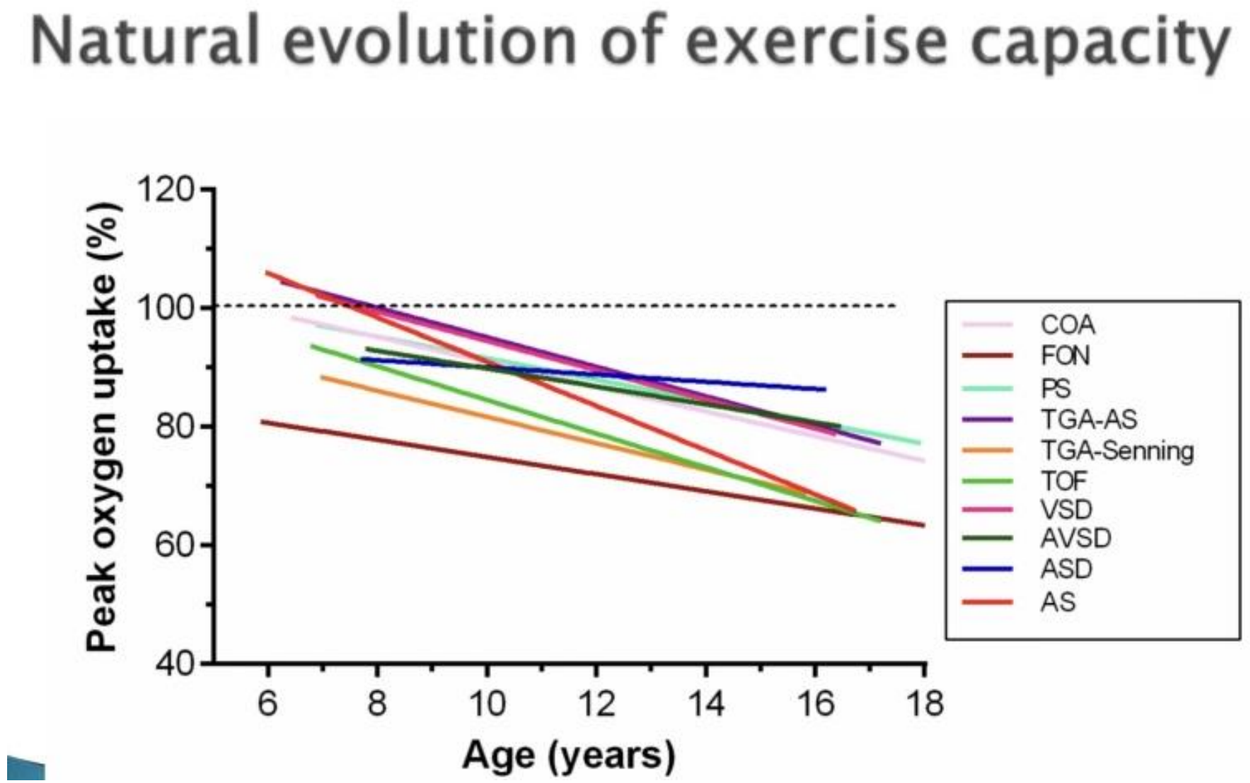
BELANG EXERCISE IS MEDICINE: NATUURLIJKE EVOLUTIE INSPANNINGSVERMOGNE IN CHD !



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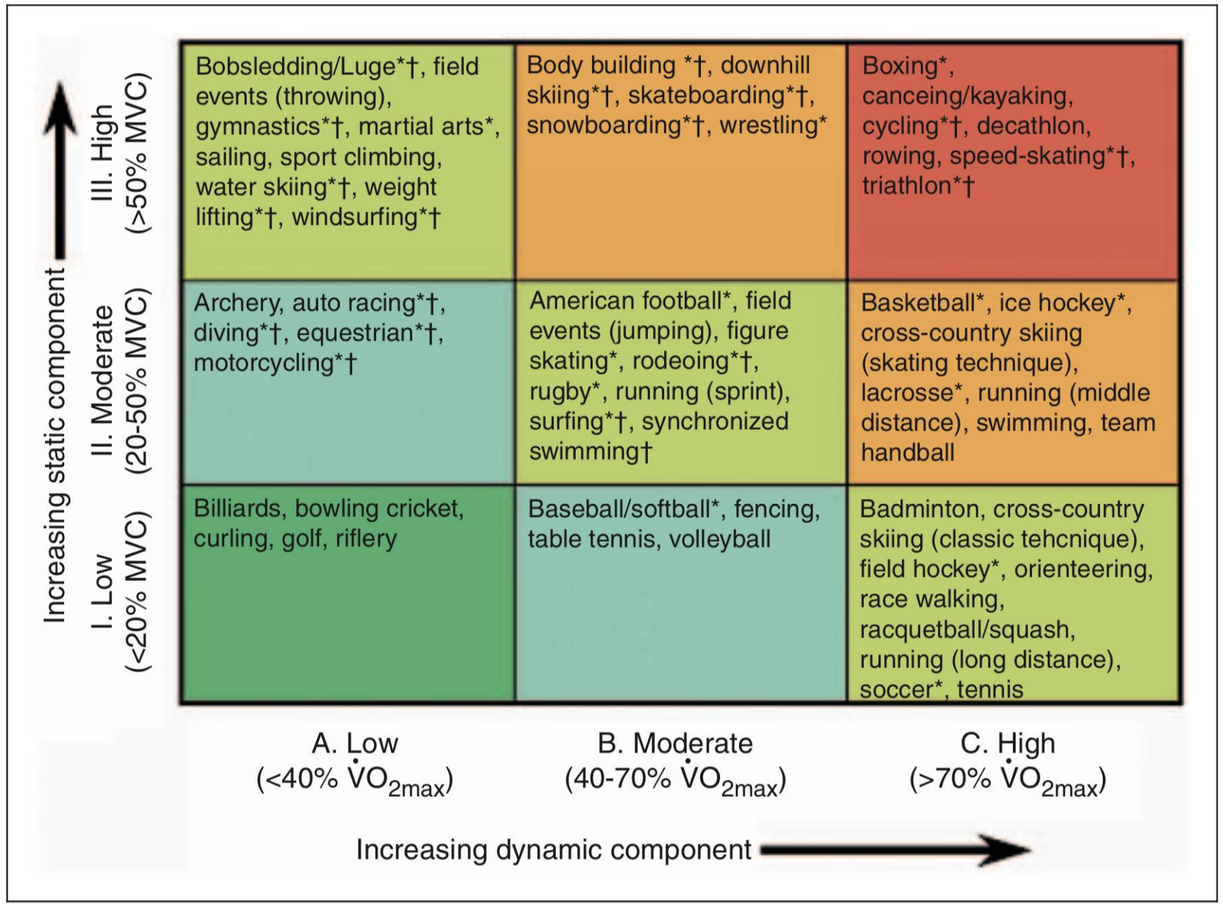
WHAT CAN THEY DO?

Recommendations for physical activity, recreation sport, and exercise training in paediatric patients with congenital heart disease: a report from the Exercise, Basic & Translational Research Section of the European Association of Cardiovascular Prevention and Rehabilitation, the European Congenital Heart and Lung Exercise Group, and the Association for European Paediatric Cardiology

T Takken[1], A Giardini[2], T Reybrouck[3], M Gewillig[4], HH Hövels-Gürich[5], PE Longmuir[6], BW McCrindle[7], SM Paridon[8] and A Hager[9]



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PEDIATRIC REHABILITATION PROGRAM

Positive impact on short AND long term

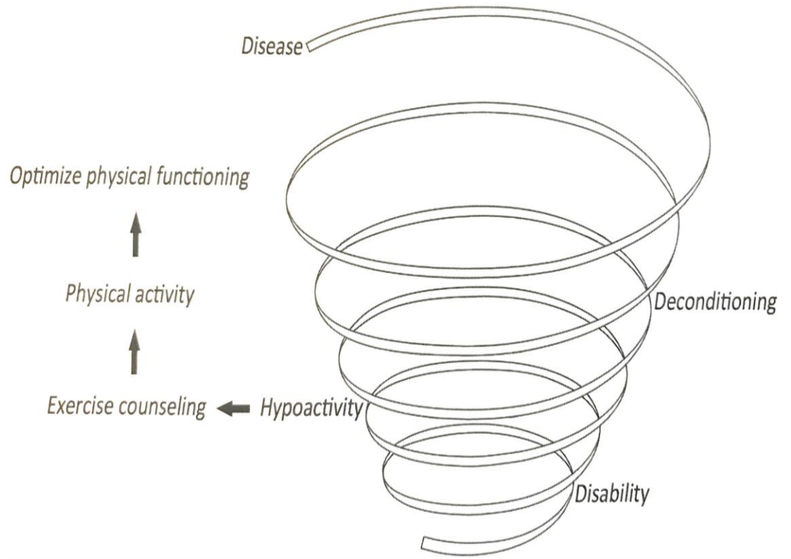
on aerobic capacity

Impact of Cardiac Rehabilitation on the Exercise Function of Children With Serious Congenital Heart Disease

Jonathan Rhodes, Tracy J. Curran, Laurel Camil, Nicole Rabideau, David R. Fulton, Naomi S. Gauthier, Kimberlee Gauvreau and Kathy J. Jenkins

Pediatrics 2005;116;1339-1345

DOI: 10.1542/peds.2004-2697



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EXERCISE PRESCRIPTION IN CHD

Tailormade recommendations

Motivateer zo veel mogelijk

Breed spectrum van sportdisciplines

motiveer patienten om deel te nemen in gelijkwaardige groepen

Belang van sporten in groep op kinderleeftijd

Young adults: monitor

- heart rate
- symptoms

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Review

Physical Activity Promotion in Pediatric Congenital Heart Disease: Are We Running Late?

Jessica E. Caterini, PhD,[a] Emma Stefanie Campisi, BKin,[b] and Barbara Cifra, MD[c]

[a] *Queen's University School of Medicine, Kingston, Ontario, Canada*

[b] *Faculty of Kinesiology and Physical Education, Toronto, Ontario, Canada*

[c] *Division of Cardiology, Labatt Family Heart Centre, The Hospital for Sick Children, Toronto, Ontario, Canada*

Key Points

- Children with CHD should be encouraged to follow public health recommendations of daily physical activity.
- Physical activity prescription should be written and set realistic, patient-centre measurable goals.
- Explicit information regarding the nature and reasons for any restrictions should be given.
- Ensure that the patients and their caregivers understand the specific signs and symptoms that signal the need for rest.
- Physical activity prescription should be reviewed and revised at every encounter.

Evidence Gaps

- Central and peripheral physiological adaptations to exercise in the different populations of CHD patients.
- Best model for physical activity promotion for larger scale interventions and for specific CHD populations.
- Best strategy to promote physical activity in patients with fewer social and financial supports.
- Best strategy for promoting for long-term adherence and sustainability.
- Reliability and validity for the use of wearable technology in pediatric CHD patients.

VERHOGEN VAN SPORTPARTICIPATIE BIJ CHRONISCH ZIEKE KINDEREN

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VOORBEELD VAN EEN EVALUATIEPROGRAMMA SPORTPARTICIPATIE

2017 Dutch Report Card+: Results From the First Physical Activity Report Card Plus for Dutch Youth With a Chronic Disease or Disability

Marcella Burghard, Nynke B. de Jong, Selina Vlieger and Tim Takken*
on behalf of the Dutch Report Card Research Group

Shared Utrecht Pediatric Exercise Research Lab, Child Development & Exercise Center, Wilhelmina Children's Hospital, University Medical Centre Utrecht, Utrecht, Netherlands

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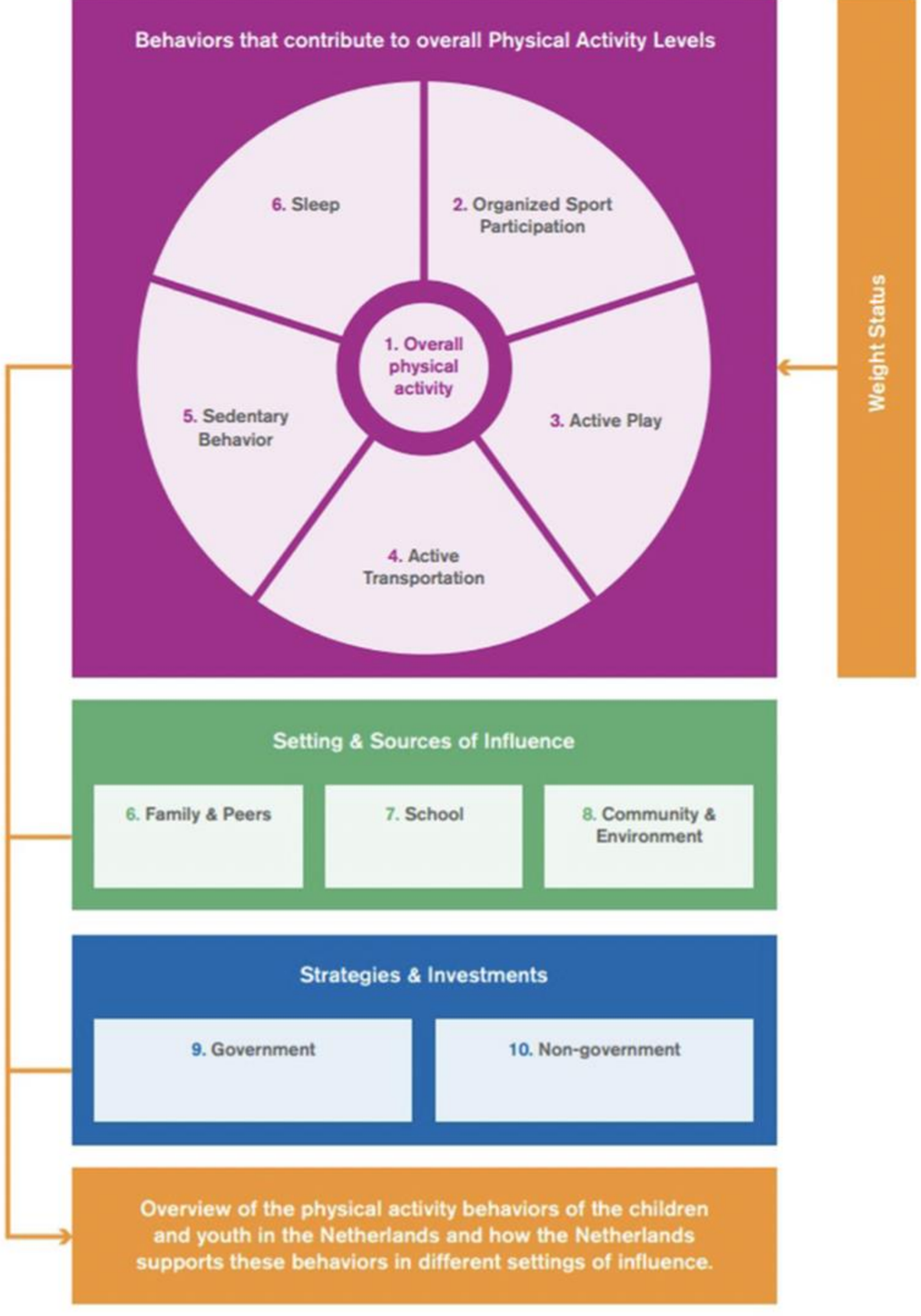
OVERZICHT VAN CATEGORIEEN EN INDICATOREN



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VOORBEELD VAN EEN EVALUATIEPROGRAMMA OM SPORTPARTICIPATIE

FIGURE 1 | Front cover of the 2017 Dutch Physical Activity Report Card+.

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VOORBEELD VAN EEN EVALUATIEPROGRAMMA OM SPORTPARTICIPATIE TE VERHOGEN

Grade		Description
A+	94–100%	We are succeeding with a large majority of children and youth.
A	87–93%	
A–	80–86%	
B+	74–79%	We are succeeding with well more than half of the children and youth.
B	67–73%	
B–	60–66%	
C+	54–59%	We are succeeding with about half of the children and youth.
C	47–53%	
C–	40–46%	
D+	34–39%	We are succeeding with less than half but some of the children and youth.
D	27–33%	
D-	20–26%	
F	<20%	We are succeeding with very few children and youth.
INC	Incomplete	Insufficient or inadequate information to assign a grade

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VOORBEELD VAN EEN EVALUATIEPROGRAMMA OM SPORTPARTICIPATIE TE VERHOGEN

TABLE 1 | Overview of indicators and corresponding grades.

Indicator	Grades
Overall physical activity	D
Organized sports participation	B–
Active play	C–
Active transportation	A–
Sedentary behavior	C
Sleep	C
Weight status	INC
Family and peers	INC
School	INC
Community and the built environment	INC
Government strategies and investments	INC

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The indicators, definitions and grades of the Dutch 2018 Physical Activity Report Card and the Report Card+ for children with a chronic medical condition.

Indicator	Definition	RC	RC+
Overall Physical Activity	Percentage of children and youth who are meeting the national physical activity recommendations	C-	D+
Organized Sport Participation	Percentage of children and youth who are weekly sports participants	B	B-
Active Play	Percentage of children who play actively outside more than 1 h on every day of the week	D	D
Active Transportation	Percentage of children and youth who commute actively (cycling/walking) to school on at least 3 days per week	A-	B+
Sedentary Behaviours	Percentage of children and youth who spend more than 2 h per day watching TV, and percentage of those who are using other screen devices for more than 2 h per day	D	D
Physical Fitness	Percentage of children and youth who are meeting the norm value on physical fitness tests for strength, endurance or flexibility	INC	INC
Family and Peers	Percentage of parents who are meeting the Dutch Physical Activity Guidelines	C	INC
School	Percentage of schools where the majority (≥80%) of students are taught by a PE specialist, and percentage of schools with an own sports hall	C+	A-
Community and Environment	Quality of the infrastructure that promotes physical activity (bicycle roads, 30 km/h speed limit, playgrounds).	INC	INC
Government	Number of projects and standardized policies to promote physical activity	INC	INC
Sleep	Percentage of children and youth meeting the recommended hours of sleep per night (4- to 12-year-olds: 9–13 h; 12- to 18-year-olds: 8–10 h)	A-	B+
Weight Status	Percentage of children and youth with a BMI indicating overweight or obesity	A-	A-

BMI°=°body mass index; RC°=°Report Card.

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ADVIEZEN : INCLUSIE BIJ CHRONISCHE ZIEKTE

- Sport op school:
  - Wegnemen angst (leerkrachten, ouders)
  - Meeste sporten geen probleem, soms specifieke richtlijnen (vb pacemaker)
- Sport in de club:
  - Stimuleren inclusie
  - Weg van “enkel competitie” – naar zoveel mogelijk mee laten doen
  - “Click” met hun sport
- Sport recreatief thuis:
  - Belang stimulatie ouders
  - Leeftijdsgenoten, voorbeeldfuncties

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BELANG STIMULEREN

- Sport op jonge leeftijd = hogere kans op sport op oudere leeftijd
- Geen sport op jonge leeftijd = bijna zeker geen sport op volwassen leeftijd

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INSPANNINGSTESTEN BIJ CHRONISCHE ZIEKTE:
METEN = WETEN

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INSPANNINGSTESTEN

Belang:

- Determineren van CV en resp respons
- Evalueren van symptomen bij inspanning
- Evalueren EIBC
- Evalueren aerobe capaciteit
- Evalueren spiersterkte en uithouding
- Follow-up van ziekte
- Evalueren van behandeling en revalidatie
- Ouders / kind overtuigen

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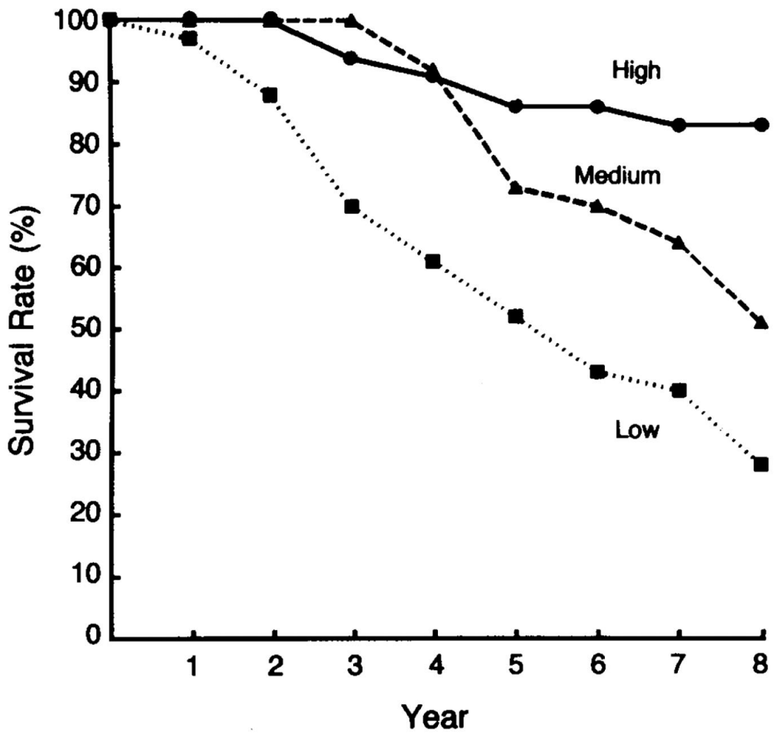
PROGNOSTISCHE WAARDE

The prognostic value of exercise testing in patients with CF



$V'O_{2\ peak} \geq$ 82% pred.

$V'O_{2\ peak}$ 59-81% pred.

$V'O_{2\ peak} \leq$ 58% pred.

Nixon PA, NEJM 1992

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EVALUATIE VIA CPET BIJ KINDEREN

- Fiets vs. looptapijt
- Duur, helling, protocol
- indicaties
- contra-indicaties

RER, VE/VCO2, VE/VO2

VAT

OUES

Wmax

VO2max

HR max, HR reserve

breathing reserve

oxygen pulse

delta VO2/Work Rate

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CONCLUSIE

- E=M uiterst belangrijk bij kinderen!
  - ontwikkeling
  - “gezondheid”
  - Economische aspecten
- Specifieke ziekten = specifieke voorschriften, vaak patient-specifiek
- Reva programma’s = zeer zinvol
- Inclusie in sportactiviteiten
- Meten = weten (CPET!)

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CONCLUSIE ROL VAN DE HUISARTS

- Meebewaken fysieke activiteit bij chronische ziekte
- Concrete adviezen
  - Motiveren
  - Inclusie in sportclubs, school,…
  - Elk geval = individueel, doch grote richtlijnen
- Overleg behandelende specialist – huisarts!
    - Ev multicisciplinaire overleg
- E=M !

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