GEMs
GOOD EVIDENCE MATTERS

GEMs of the Week

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What's in this week's issue?

Week of December 19 - 23, 2022

SPOTLIGHT: If Screen Time is Limited, Will Kids Get Active Instead?

- Let's Get Physical: Evidence That Exercise May Help Troubleshoot Resistant Hypertension
- Running into Injury? Is it Preventable?
- Go Green to Stay Lean: How a Plant-Based Diet Can Affect Healthcare Workers

If Screen Time is Limited, Will Kids Get Active Instead?

Effects of Limiting Recreational Screen Media Use on Physical Activity and Sleep in Families with Children: A Cluster Randomized Clinical Trial

Pedersen J, Rasmussen MGB, Sørensen SO, et al. Effects of Limiting Recreational Screen Media Use on Physical Activity and Sleep in Families with Children: A Cluster Randomized Clinical Trial. *JAMA Pediatr*. 2022; 176(8): 741-749. doi:10.1001/jamapediatrics.2022.1519

KEY TAKEAWAY: Compared to families with typical screen usage, limiting families' recreational screen time to less than seven hours per week significantly increases physical activity in children by approximately 46 minutes per day. However, no significant difference in physical activity was found in adults.

STUDY DESIGN: Single blinded, parallel, cluster randomized controlled trial

LEVEL OF EVIDENCE: STEP 2

BRIEF BACKGROUND INFORMATION: Screen use continues to increase among all age groups. Studies suggest a link between increased consumption of technology and various adverse health outcomes such as obesity and poor mental health in both children and adults. As typical electronic device usage is considered a sedentary activity, reducing overall time spent on electronics may encourage more physically active behaviors.

PATIENTS: Children and their adult parent(s)

INTERVENTION: Limit recreational screen usage

CONTROL: Typical screen usage

PRIMARY OUTCOME: Physical activity

Secondary Outcomes: Moderate to vigorous physical activity (MVPA), weekend and weekday leisure non-sedentary activity, sleep duration, sleep onset latency, waking after sleep onset, changes in proportions of light, deep, and rapid eye movement (REM) sleep

METHODS (BRIEF DESCRIPTION):

- The participants consisted of 89 families (181 children and 164 adults) selected from 10 Danish municipalities.
- Eligibility included at least 2.4 hours of average daily recreational screen use, and parents employed full time (excluding night shift) or enrolled in full-time education. Families had at least one child in the home 6–10 years old.
- Families were randomly assigned to either screen media reduction intervention or control (typical screen use) for two weeks. For the intervention group, families were instructed to reduce their recreational screen use to three hours or less per week. Parents were allowed up to 30 min/day to coordinate appointments. Intervention compliance was set as less than seven hours of screen consumption weekly.
- At least one adult per family handed over their personal portable devices including cell phones and tablets for the duration of the study.
- Time spent watching TV was calculated by assessing the power cord current, while applications downloaded onto portable devices and computers tracked usage, all contributing to total leisure screen time.
- Screen usage was also self-reported in a diary and compared to the electronically tracked data.
- Physical activity levels were monitored via accelerometers worn on the hip and thigh.
- Sleep was monitored in participants over six years old using single channel electroencephalography during three nights at baseline and follow-up to sort sleep data into awake, light sleep, deep sleep, and REM sleep.

INTERVENTION (# IN THE GROUP): 45 families (86 children and 82 adults)

COMPARISON (# IN THE GROUP): 44 families (95 children and 82 adults)

FOLLOW UP PERIOD: Two weeks

RESULTS:

Primary Outcome –

- In children, limited screen time significantly increased physical activity compared to typical screen time (mean difference [MD] 46 min/day; 95% CI, 28–64).
- In adults, limited screen time did not produce a significant increase in physical activity compared to typical screen time (MD 19 min/day; 95%, CI –1.7 to 40).

Secondary Outcomes –

- Compared to typical screen time, limited screen time:
  - Significantly increased MVPA in children (MD 8.8 min/day; 95% CI, 3.6–14).
  - Significantly increased children's weekday (MD 34 min/day; 95% CI, 16–52) and weekend day leisure non-sedentary activity (MD 73 min/day; 95% CI, 41–106).
- In adults, no significant differences in leisure non-

sedentary time, leisure MVPA/day, or weekday/weekend day non-sedentary leisure activity between the intervention and control groups were found.
- In either children or adults, no significant differences in any of the sleep measurements between the two groups were noted.

LIMITATIONS:

- Inability to blind study participants.
- Some participants in the control group reduced their screen use.
- Findings may not be generalizable to children outside the age ranges studied or outside of Southern Denmark.

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The opinions and assertions herein are those of the author and are not to be construed as official or as reflecting the views of the U.S. Air Force Medical Department, the Air Force at large, or the Department of Defense.

Let's Get Physical: Evidence That Exercise May Help Troubleshoot Resistant Hypertension

Effect of Exercise Training on Ambulatory Blood Pressure Among Patients with Resistant Hypertension: A Randomized Clinical Trial

Lopes S, Mesquita-Bastos J, Garcia C, et al. Effect of Exercise Training on Ambulatory Blood Pressure Among Patients with Resistant Hypertension: A Randomized Clinical Trial. *JAMA Cardiol.* 2021; 6(11):1317-1323. doi: 10.1001/jamacardio.2021.2735.

KEY TAKEAWAY: Aerobic exercise can help lower blood pressure in patients with resistant hypertension.

STUDY DESIGN: Prospective, two-center, single-blinded, randomized clinical trial

LEVEL OF EVIDENCE: STEP 2

BRIEF BACKGROUND INFORMATION: Prior to this trial (EnRicH Trial) there was limited evidence that exercise was beneficial as an intervention to help lower blood pressure in patients with resistant hypertension. Previous trials involved interventions that were less accessible and not as easy to replicate.

PATIENTS: Adults with resistant hypertension

INTERVENTION: Aerobic training program with usual care

CONTROL: Usual care

PRIMARY OUTCOME: Change in 24-hour ambulatory systolic blood pressure (BP)

Secondary Outcomes: Change in 24-hour ambulatory diastolic BP, change in daytime ambulatory systolic and diastolic BP, change in 24-hour heart rate

METHODS (BRIEF DESCRIPTION):

- This study took place from March 2017 to December 2019 in Portugal.
- Patients had confirmed resistant hypertension.
  - Resistant hypertension: 24-hour ambulatory mean systolic blood pressure 130 mmHg or greater and/or daytime mean SBP 135 mmHg or greater while taking maximum tolerated doses of at least three antihypertensive drugs including a diuretic, or controlled blood pressure while taking four or more antihypertensive agents
- Exclusion criteria: secondary hypertension, evidence of target organ damage, heart failure, acute cardiovascular event <1 year, PAD, CKD, kidney failure, COPD, limitations to physical activity, regular exercise training, change of antihypertensive medication within three months of the start of the trial
- Participants were randomized 1:1 to 12 week aerobic exercise training program or 12 weeks of continued "usual care", referring to usual advice on lifestyle modifications and optimal drug treatment prescribed by their primary care physician. Computer-based stratified randomization was generated with the strata defined by age (40–55 years, 56–65 years, and 66–75 years) and sex.
- The intervention consisted of three supervised training sessions weekly including: 10 minutes of warm up, 40 minutes of progressively intense aerobic exercise (cycling or walking) and 10 minutes of cool down, with goal VO_2 max 50–70% during aerobic training.
- Primary outcomes and secondary outcomes were assessed at baseline and after the 12-week intervention.
- Primary outcome: Mean change from baseline of 24-hour ambulatory systolic BP compared between exercise and usual care group.
- Secondary outcomes: Mean changes in 24-hour ambulatory diastolic BP, daytime ambulatory systolic BP, daytime ambulatory diastolic BP, office systolic BP, heart rate, cardiorespiratory fitness (max oxygen uptake, VO_2 max) and body composition.

INTERVENTION (# IN THE GROUP): 26

COMPARISON (# IN THE GROUP): 27

FOLLOW UP PERIOD: 12 weeks

RESULTS:

Primary Outcome –

- 24-hour ambulatory systolic BP was lower in the exercise group compared to the usual care group (difference in mean change from baseline –7.1 mmHg; 95% CI, –13 to –1.4).

Secondary Outcomes –

- 24-hour ambulatory diastolic BP was reduced in the exercise group compared to the usual care group (difference in mean change from baseline –5.1 mmHg; 95% CI, –7.9 to –2.3).
- There was a reduction in the exercise group vs. control:
  - Daytime ambulatory systolic blood pressure (difference in mean change from baseline –8.4 mmHg; 95% CI, –14 to –2.5)
  - Daytime ambulatory diastolic BP (difference in mean change from baseline –5.7 mmHg; 95% CI, –9.0 to –2.4)
  - Office systolic BP (difference in mean change from baseline –10 mmHg; 95% CI, –17 to –2.5)

- Positive mean change in cardiorespiratory fitness seen in exercise group vs. the usual care group (difference in mean change from baseline 5.1 mL/kg per minute O_2 consumption; 95% CI, 3.5–6.6).
- The exercise group saw a decreased 24-hour heart rate (difference in mean change from baseline –5.7 bpm; 95% CI, –9.3 to –2.0) and daytime heart rate (difference in mean change from baseline –7.5 bpm; 95% CI, –12 to –3.4) vs. the usual care group.

LIMITATIONS:

- Results were specific to aerobic exercise and may not be generalizable to other types of exercise.
- The population sample consisted of patients with baseline biochemical parameters near or at recommended levels, which limits generalizability of the findings.
- The trial was not powered to detect effects in subgroups, such as sex.
- Four of the patients in the exercise and three in the usual care group were lost to follow up.
- It is unclear whether results are generalizable to a US population.

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Running into Injury? Is it Preventable?

A Randomized Study of a Strength Training Program to Prevent Injuries in Runners of the New York City Marathon

Toresdahl BG, McElheny K, Metzl J, Ammerman B, Chang B, Kinderknecht J. A Randomized Study of a Strength Training Program to Prevent Injuries in Runners of the New York City Marathon. *Sports Health*. 2020;12(1):74-79. doi:10.1177/1941738119877180

KEY TAKEAWAY: A 12-week strength training program does not affect major overuse injury risk in first time marathon runners. However, there is evidence that runners compliant with the training program are more likely to complete the race and have lower rates of minor injuries. On the contrary, noncompliant runners have faster finishing times and less major injuries.

STUDY DESIGN: Randomized control trial

LEVEL OF EVIDENCE: STEP 2

BRIEF BACKGROUND INFORMATION: Overuse injuries are common in runners, particularly endurance runners. Poor biomechanics due to weak hip and core stabilizers increase that risk. As recreational and competitive running interests increase in popularity, overuse injuries can be expected in individuals adopting running as a hobby.

PATIENTS: First time marathon runners

INTERVENTION: 12-week strength training program

CONTROL: No strength training program

PRIMARY OUTCOME: Major and minor injury, race performance

Secondary Outcomes: Subgroup analysis on major and minor injury, completion of the race, finishing times

METHODS (BRIEF DESCRIPTION):

- Runners that had signed up for the NYC Marathon were recruited via email and volunteered to participate.
- Inclusion criteria: English speaking, 18 years or older, never participated in a marathon, no current injury
- Participants were randomized into two groups:
  - The observational group did not receive instructional videos on strength training but were allowed to complete strength training on their own while training for the marathon.
  - The strength training group received a 10-minute instructional video and handout to perform three times per week for 12 weeks prior to running the marathon. No restrictions from other forms of strength training were implemented.
- A baseline survey was conducted and follow up occurred every 2 weeks.
- Runners reported progress, injury, and compliance with the program.
- A final survey was done one week after the race to determine benefits of the training program.
- Major injury was characterized by an overuse injury resulting in noncompletion of the race. Injuries included, bone stress injuries (most common), tendon/fascia, joint, muscle, and unspecified.
- Minor injuries were overuse injuries that altered training or race performance but did not prevent race completion. Most frequent minor injuries included knee pain, calf strain, medial tibial stress syndrome, IT band syndrome, Achilles tendinopathy.
- Chi-square test was used to assess if the strength training program could reduce the rate of marathon noncompletion due to overuse injury.
- A two-sample t-test compared finishing times between groups and assessed major and minor injury, and race performance in the subgroup within the strengthening arm between compliant and noncompliant runners.

INTERVENTION (# IN THE GROUP): 273

COMPARISON (# IN THE GROUP): 310

FOLLOW UP PERIOD: 12 weeks

RESULTS:

Primary Outcomes –

- Strength training did not significantly affect average finishing time compared to no training (5 hours 1.1 mins vs 4 hours 58 mins; *P*=.35).
- Strength training did not significantly reduce major injuries compared to no training (7.1% vs 7.3%, respectively; RR 0.97; 95% CI, 0.57–1.6).
- Strength training did not significantly reduce minor injuries compared to no training (46% vs 50%, respectively; RR 0.92; 95% CI, 0.79–1.1).

Secondary Outcomes –

- Compliant runners were more likely to complete the race, compared to noncompliant runners (90% vs 83%, respectively; *P*=.01), with lower incidence of minor injury (43% vs 56%; *P*=.01).
- There was no difference in finishing time or major injuries.

LIMITATIONS:

- Participants were self-recruited based on interest which could lead to selection bias.
- Short duration of strength training prior to the marathon could have been insufficient time to increase meaningful strength in participants. Further, athletes were not monitored to determine if they were completing the exercises correctly.
- Both groups were allowed to participate in additional strength training which could be a confounding variable.
- Population in the study were majority female across both groups, however, does not represent the population of the NY Marathon.

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Go Green to Stay Lean: How a Plant-Based Diet Can Affect Healthcare Workers

Nutrition for Hospital Workers During a Crisis: Effect of a Plant-Based Dietary Intervention on Cardiometabolic Outcomes and Quality of Life in Healthcare Employees During the COVID-19 Pandemic. American Journal of Lifestyle Medicine

Kahleova H, Berrien-Lopez R, Holtz D, et al. Nutrition for Hospital Workers During a Crisis: Effect of a Plant-Based Dietary Intervention on Cardiometabolic Outcomes and Quality of Life in Healthcare Employees During the COVID-19 Pandemic. *Am J Lifestyle Med*. 2021; 16(3):399-407. Published 2021 Nov 5. doi:10.1177/15598276211050339

KEY TAKEAWAY: A low-fat vegan diet may reduce body weight, total and LDL cholesterol, fasting plasma glucose, and diastolic blood pressure, while increasing the quality of life in hospital employees.

STUDY DESIGN: Randomized controlled trial

LEVEL OF EVIDENCE: STEP 3 (downgraded due to small sample size)

BRIEF BACKGROUND INFORMATION: Plant-based diets have been shown to reduce body weight, blood pressure, fasting plasma glucose, and plasma lipids, and improve quality of life. However, there is a lack of studies testing these benefits in healthcare workers who are at the forefront of the COVID pandemic.

PATIENTS: Hospital employees with a BMI >25 kg/m^2

INTERVENTION: Low-fat vegan diet

CONTROL: No diet change

PRIMARY OUTCOME: Body weight, total and LDL cholesterol, fasting plasma glucose, diastolic blood pressure, quality of life, overall satisfaction with diet

METHODS (BRIEF DESCRIPTION):

- Between January 2020 and September 2020 at Sibley Memorial Hospital, hospital employees with a BMI >25 kg/m^2 were enrolled.
- Exclusion criteria were type 1 diabetes, smoking, alcohol or drug abuse, pregnancy or lactation, and current use of a vegan diet.
- Participants were randomly assigned (1:1 ratio) to the intervention group or control group.
- The intervention diet consisted of vegetables, grains, legumes, and fruits, without animal products or added fats. Participants were asked to eat less than 30 g of total fat per day and were instructed to favor low-glycemic index foods. No meals were provided, with no limits on grains or added sugars. Vitamin B12 was supplemented (500 µg/day orally).
- At baseline and at 12 weeks, dietary intake data over three consecutive days was collected and analyzed by the Nutrition Data System for Research.
- Height, weight, blood pressure, plasma glucose concentration, HbA1c, quality of life, and overall satisfaction were all assessed using a crossover ANOVA computer program model.
- Quality of life was measured using the SF-36 questionnaire with scores ranging from 1 to 100, with higher scores indicating a better quality of life.
- Overall satisfaction was measured using the Food Acceptability Questionnaire with scores ranging from 1 to 7, with higher scores indicating better quality of life.

INTERVENTION (# IN THE GROUP): 16

COMPARISON (# IN THE GROUP): 16

FOLLOW UP PERIOD: 12 weeks

RESULTS:

- The low-fat vegan diet decreased body weight in health care workers compared to the control group (–5.6 kg vs 0.1 kg respectively; *P*=.01).
- The low-fat vegan diet decreased total and LDL cholesterol in health care workers compared to the control group (–25 mg/dL vs 5.3 mg/dL and –20. mg/dL vs 4.4 mg/dL respectively; *P*=.02).
- The low-fat vegan diet decreased fasting plasma glucose in health care workers compared to the control group (–8.3 mg/dL vs 3.1 mg/dL; *P*=.007).
- The low-fat vegan diet decreased diastolic blood pressure in health care workers compared to the control group (–6.6 mmHg vs +1.9 mmHg; *P*=.03).
- The low-fat vegan diet increased total quality of life in health care workers compared to the control group (31 points vs 11 points; *P*=.05).
- The low-fat vegan diet increased overall satisfaction in health care workers compared to the control group (1.8 points vs –0.3 points; *P*=.02).

LIMITATIONS:

- Due to the COVID pandemic, there was a high drop-out rate. 11 out of 16 people withdrew from the control group and 12 out of 16 people withdrew from the intervention group.
- The study was originally planned as a two-arm design, but due to the high drop-out rate, the final analysis was treated as a crossover study.

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