GEMs
GOOD EVIDENCE MATTERS

GEMs of the Week

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What's in this week's issue?

Week of January 10 - 14, 2022

SPOTLIGHT: Health Wearable Device Impact on Weight and BMI in Individuals Who are Overweight or Obese

- Does Cycling Decrease Mortality in Patients with Diabetes?
- Does a History of Spontaneous Abortion Increase Mortality?

Health Wearable Device Impact on Weight and BMI in Individuals Who are Overweight or Obese

GEMs GOOD EVIDENCE MATTERS SPOTLIGHT

Health Wearable Devices May Reduce Weight and BMI in Individuals with Overweight/Obesity and Chronic Comorbidities

McDonough DJ, Su X, Gao Z. Health wearable devices for weight and BMI reduction in individuals with overweight/obesity and chronic comorbidities: systematic review and network meta-analysis. *Br J Sports Med*. 2021; 55(16):917–925. doi:10.1136/bjsports-2020-103594.

KEY TAKEAWAY: Health wearable devices are effective at promoting physical activity, leading to body weight and BMI reduction in overweight/obese individuals with chronic comorbidities.

STUDY DESIGN: Systematic review and network meta-analysis of 31 RCTs (N=2,268)

LEVEL OF EVIDENCE: STEP 1

BRIEF BACKGROUND INFORMATION:

Overweight/obesity and their associated chronic comorbidities are growing problems. Physical activity targets result in weight loss that in turn reduce the morbidity and mortality related to these chronic diseases. Beyond traditional counseling on dietary and physical activity goals, behavioral interventions utilizing technology (e.g., commercial and research health wearable devices) are an innovative strategy to promote physical activity and weight loss.

PATIENTS: Overweight/obese physically inactive adults with at least one weight-related chronic comorbidity

INTERVENTION: Guided physical activity utilizing health/fitness wearable devices (e.g., Fitbit, accelerometer or pedometers) with or without nutrition counseling

CONTROL: "Usual" lifestyle

OUTCOME: Body weight or BMI reduction

METHODS (BRIEF DESCRIPTION):

- A systematic review and network meta-analysis of 31 RCTs (2007–2020), of which 15 evaluated reduction of body weight and 16 examined BMI reduction.
- Comparative arms in the meta-analysis included:
  - Patients' "usual" care
  - Traditional physical activity interventions/goals (weekly minimums of moderate-to-vigorous activity) with one of the following:
    - Commercial health wearable-only interventions
    - Research grade wearable-only interventions
    - Multicomponent commercial grade health wearable: health grade wearable intervention and additional components such as nutrition counseling
- Included RCTs investigated research grade or commercial health wearable-based physical activity interventions to achieve steps per day and/or weekly minimums of 150 min/week of moderate-to-vigorous intensity physical activity. Comparison groups maintained the same traditional recommendations for physical activity.
- The control group with "usual" lifestyle was not defined.
- Meta-analysis calculated and compared the average differences and standard deviations of pre- and post-intervention weight loss (kg) or BMI (kg/m^2) reduction of the intervention arms.

INTERVENTION (# IN THE GROUP): 1,224

COMPARISON (# IN THE GROUP): 1,044

FOLLOW UP PERIOD: 4–52 weeks

RESULTS:

Weight Loss Reduction –

- Commercial health wearable-only were more effective compared to other interventions and control (SMD –2.8; 95% CI, –4.8 to –0.81).

BMI Reduction –

- Accelerometer/pedometers were more effective than control (SMD –2.1; 95% CI, –3.3 to –0.78).
- Multicomponent accelerometer/pedometers were more effective than control (SMD –3.4; 95% CI, –4.9 to –2.1).

LIMITATIONS:

- There is a high risk of performance bias in the included studies.
- Included studies had intervention durations from 4 to 52 weeks.
- There was no standardization between the multi-component portion (e.g., instructions or feedback given) of the health wearable interventions.
- No comparison between which specific commercial wearable was best.

- No secondary analysis based upon the patients' specific weight-related comorbidity.

Jacqueline Yurgil, DO & Steven Embry, DO
Offutt Air Force Base
Bellevue, NE

The views expressed are those of the authors and do not reflect the official policy or position of the US Air Force, Department of Defense or the US Government.

Does Cycling Decrease Mortality in Patients with Diabetes?

Association of Cycling with All-Cause and Cardiovascular Disease Mortality Among Persons with Diabetes: The European Prospective Investigation into Cancer and Nutrition (EPIC)

Ried-Larsen M, Rasmussen MG, Blond K, et al. Association of Cycling with All-Cause and Cardiovascular Disease Mortality Among Persons with Diabetes: The European Prospective Investigation into Cancer and Nutrition (EPIC) Study. *JAMA* Intern Med. 2021; 181(9):1196–1205. doi:10.1001/jamainternmed.2021.3836

KEY TAKEAWAY: Starting and maintaining cycling for over 60 minutes weekly may be associated with a decrease in all-cause and cardiovascular disease mortality after five years in adults with diabetes.

STUDY DESIGN: Prospective cohort study

LEVEL OF EVIDENCE: STEP 3

BRIEF BACKGROUND INFORMATION: Premature cardiovascular and all-cause mortality is higher in people with diabetes; however, cardiovascular risk factors are improved with structured exercise. Cycling has been associated with a decreased risk of all-cause and cardiovascular mortality in the general population; although, the role of cycling in preventing premature mortality in people with diabetes has not been studied.

PATIENTS: Adults with diabetes

INTERVENTION: Time spent cycling (minutes per week)

CONTROL: No cycling

OUTCOME: All-cause mortality

Secondary Outcome: Cardiovascular mortality

METHODS (BRIEF DESCRIPTION):

- This prospective cohort study included 7,459 adult patients with diabetes at baseline.
- The study was conducted through the European Prospective Investigation into Cancer and Nutrition (EPIC) study cohort.
- Exposure was patient-reported weekly as time spent cycling.
- Questionnaires at baseline and five years included personal and socioeconomic demographics, medical comorbidities, smoking status, BMI, adherence to Mediterranean diet, and time spent cycling.
- Baseline leisure-time physical activity (LTPA) habits minus cycling were also measured.
- The second evaluation at five years categorized patients into four groups (no cycling, stopped cycling, started cycling, and maintained cycling).
- Cause of death was obtained through records or direct follow-up.
- The risks of all-cause and cardiovascular disease mortality were computed as hazard ratios (95% CI) according to weekly time cycling at baseline.

INTERVENTION (# IN THE GROUP): 7,459

COMPARISON (# IN THE GROUP): Not available

FOLLOW UP PERIOD: Five years

RESULTS:

Primary Outcome –

- All-cause mortality was lower for people reporting any cycling vs no cycling for greater than 60 minutes weekly, but not for less than 60 minutes weekly.
  - Stratified multivariable adjusted hazard ratios (HR) were:
    - Cycling 1 to 59 minutes: HR 0.81 (95% CI, 0.64–1.03)
    - Cycling for 60 to 149 minutes: HR 0.77 (95% CI, 0.66–0.90)
    - Cycling for 150 to 299 minutes: HR 0.70 (95% CI, 0.59–0.84)
    - Cycling for ≥300 minutes: HR 0.81 (95% CI, 0.68–0.97)
  - Adjustment for educational level, lifestyle, and diabetes duration did not alter the association between cycling and all-cause mortality

Secondary Outcome –

- Cardiovascular mortality was lower for people reporting any cycling vs no cycling for greater than 60 minutes weekly, but not less than 60 minutes or ≥300 minutes weekly.
    - Cycling 1 to 59 minutes: HR 0.83 (95% CI, 0.59–1.2)
    - Cycling for 60 to 149 minutes: HR 0.78 (95% CI, 0.63–0.98)
    - Cycling for 150 to 299 minutes: HR 0.61 (95% CI, 0.46–0.81)
    - Cycling for ≥300 minutes: HR 0.91 (95% CI, 0.70–1.2)
  - A dose-response relationship between baseline cycling and all-cause and CVD mortality was observed.

LIMITATIONS:

- Some diabetes diagnoses were self-reported.
- No distinction between type I and type II diabetes.
- Intervention adherence was self-reported.
- Effects of other variables (e.g., pharmacological interventions) were not considered.
- Causes of death were not clearly categorized.

Scott T Larson, MD; Jessica M Rockafellow, MD; & Stephanie K Bunt, PhD
University of Iowa Hospitals & Clinics
Iowa City, IA

Does a History of Spontaneous Abortion Increase Mortality?

Association of Spontaneous Abortion with All Cause and Cause Specific Premature Mortality: Prospective Cohort Study

Wang YX, Mínguez-Alarcón L, Gaskins AJ, et al. Association of spontaneous abortion with all cause and cause specific premature mortality: prospective cohort study. *BMJ*. 2021;372:n530. Published 2021 Mar 24. doi:10.1136/bmj.n530

KEY TAKEAWAY: Prior spontaneous abortion is associated with an increased risk of premature mortality, especially due to cardiovascular disease. Mortality risk also increases with the number of spontaneous abortions and younger age when spontaneous abortions occurred.

STUDY DESIGN: Prospective cohort study

LEVEL OF EVIDENCE: STEP 3

BRIEF BACKGROUND INFORMATION: Spontaneous abortion is a common occurrence, as it is the result of 10–15% of pregnancies. Often, a cause is not determined, and the patient may or may not become successfully pregnant later. While spontaneous abortion is known to be possibly related to current cardiovascular issues, it was not considered a risk factor for premature mortality later in life.

PATIENTS: Nurses in the US Nurses' Health Study who have ever been pregnant

INTERVENTION: Nurses who experienced spontaneous abortion

CONTROL: Gravid nurses who have not had a spontaneous abortion

OUTCOME: All-cause mortality before 70 years old
Secondary Outcome: Cause-specific mortality before 70 years old

METHODS (BRIEF DESCRIPTION):

- Data was obtained from the US Nurses' Health Study II, an ongoing prospective cohort which began in 1989 with 116,429 nurses 25–42 years old.
- The following self-reported data was collected on a biennial basis:
  - Pregnancy-Related Factors: Gravida/para-status, and spontaneous abortion, hypertension in pregnancy and gestational diabetes
  - Demographic factors: Age, race/ethnicity, marriage status
  - Other health factors: Pre-pregnancy and current BMI, exercise, alcohol use, diet, family history of cardiovascular disease
- Participants who had ever been pregnant were included (n=101,681).
- Researchers utilized time-dependent multivariable adjusted Cox proportional hazard models to explore the association between spontaneous abortion and the risk of all-cause and cause-specific premature death while controlling for the demographic, health, and lifestyle factors listed above.

INTERVENTION (# IN THE GROUP): 26,102
COMPARISON (# IN THE GROUP): 75,579

FOLLOW UP PERIOD: 24 years

RESULTS:

Primary Outcome –

- Those with a history of spontaneous abortion were at a greater risk of all-cause mortality compared to those without (HR 1.2; 95% CI, 1.1–1.3).

Secondary Outcome –

- The more spontaneous abortions a participant had, the greater their risk of all-cause mortality.
  - ≥3 spontaneous abortions (HR 1.6; 95% CI, 1.2–2.2)
  - 2 spontaneous abortions (HR 1.2; 95% CI, 1.0-1.5)
  - 1 spontaneous abortion (HR 1.2; 95% CI, 1.1–1.3)
- The younger the participant was when spontaneous abortion occurred, the greater their risk of all-cause mortality.
  - <24 years old (HR 1.3; 95% CI, 1.1–1.5)
  - 24–29 years old (HR 1.2; 95% CI, 1.0–1.3)
  - ≥30 years old (HR 1.1; 95% CI, 0.98–1.3)
- A history of spontaneous abortion increased the risk of death from cardiovascular disease (HR 1.5; 95% CI, 1.1–2.0).
- A history of spontaneous abortion did not influence risk of premature death from cancer (HR 1.1; 95% CI, 0.94–1.2).

LIMITATIONS:

- Limited generalizability as study only included nurses who were mostly non-Hispanic white women.
- Spontaneous abortions were self-reported.

- Insufficient data to assess risk of all other causes of death.

Chyleigh Harmon, MD
Saint Louis University School of Medicine Family Medicine Program
St. Louis, MO