Meeting 4
Youth

Chair: Russ Pate

Members: Chuck Hillman, Kathy Janz, Peter Katzmarzyk, Ken Powell, Melicia Whitt-Glover
Experts and Consultants

- Invited experts: None.
- Consultants: None.
1. In children under age 6, is physical activity related to health outcomes?

2. In children and adolescents, is physical activity related to health outcomes?

3. In children and adolescents, is sedentary behavior related to health outcomes?
1. In children under age 6, is physical activity related to health outcomes?
   a. What is the relationship between physical activity and adiposity/weight status?
   b. What is the relationship between physical activity and bone health?
   c. What is the relationship between physical activity and cardiometabolic health?
   d. Are there dose-response relationships? If yes, what are the shapes of those relationships?
   e. Do the relationships vary by age, sex, race/ethnicity or socio-economic status?

• Source of evidence to answer question
  – De novo systematic review of original articles
**Analytical Framework**

**Systematic Review Question**
In children under age 6, is physical activity related to health outcomes?

**Target Population**
Children, ages 0–6

**Comparison**
Least active subgroup

**Intervention/Exposure**
All types and intensities of physical activity, including any kind of play (structured or free), sports, and other activities

**Endpoint Health Outcomes**
- Adiposity
- Asthma
- Blood pressure
- Body composition
- Bone, bone mineral content, bone geometry, bone mineral density
- Fatness
- Gross motor movement
- Gross motor skill development
- Growth
- Motor skill competence
- Muscle mass, lean mass
- Musculoskeletal development and fitness
- Physical fitness
- Weight (underweight, normal, overweight, obese)
- Weight status
- Weight trajectory change
- Cardiometabolic risk factors
Search Results: High-Quality Reviews¹ and Reports

Identification
- PubMed database searching
  N = 222
- Cochrane database searching
  N = 112
- CINAHL database searching
  N = 6

Records after duplicates removed
N = 335

Screening
- Titles screened
  N = 335
  Excluded based on title
  N = 51
- Abstracts screened
  N = 284
  Excluded based on abstract
  N = 247
- Articles for review of full text
  N = 37
  Excluded based on full text
  N = 37

Eligibility

Included
- Studies included
  N = 0

¹ Reviews include systematic reviews, meta-analyses, and pooled analyses.
Search Results: Original Research

Identification
- PubMed database searching N = 363
- Cochrane database searching N = 765
- CINAHL database searching N = 21

Screening
- Records after duplicates removed N = 1040
  - Titles screened N = 1040
    - Excluded based on title N = 629
  - Abstracts screened N = 412
    - Excluded based on abstract N = 322
  - Articles for review of full text N = 90
    - Excluded based on full text N = 72

Eligibility
- Studies included from supplementary strategies N = 7
- Studies included N = 25

Youth Subcommittee • July 19-21, 2017
Question #1

• In children under age 6, is physical activity related to health outcomes?
Conclusions:

Strong evidence demonstrates that higher amounts of physical activity are associated with more favorable indicators of bone health and with reduced risk for excessive increases in body weight and adiposity in children 3-6 years of age.

• Grade: Strong
Question 1 – Subquestion a

a. What is the relationship between physical activity and adiposity/weight status?
• Body Weight and Adiposity
  – Strong evidence demonstrates that higher amounts of physical activity are associated with a reduced risk of excessive increases in body weight and adiposity in children ages 3 to 6 years.
Description of the Evidence

- **Body Weight and Adiposity**
  - 13 Prospective observational studies
  - Objectively measured physical activity
  - 8 of the studies found negative associations between physical activity and weight and/or adiposity
  - Evidence not sufficient to identify a particular dose
b. What is the relationship between physical activity and bone health?
• Bone Health
  – Strong evidence demonstrates that higher amounts of physical activity are associated with favorable indicators of bone health in children ages 3 to 6 years.
Description of the Evidence

• Bone Health
  – 10 papers representing 4 studies
  – Randomized clinical trials and prospective observational study design
  – All studies utilized state-of-the-art bone imaging procedures
  – Studies found physical activity is positively associated with stronger bone
  – Evidence not sufficient to identify a particular dose
c. What is the relationship between physical activity and cardiometabolic health?
Cardiometabolic Risk Factors

- Available evidence is insufficient to determine the effects of physical activity on cardiometabolic risk factors in children ages 3 to 6 years.
• Cardiometabolic Risk Factors
  – 3 prospective cohort studies
  – Evidence not sufficient to determine a relationship between physical activity and cardiometabolic risk factors
d. Are there dose-response relationships? If yes, what are the shapes of those relationships?
• Dose-Response
  – Available evidence is insufficient to determine the dose-response relationship between physical activity and health effects in children ages 3 to 6 years.
e. Do the relationships vary by age, sex, race/ethnicity or socio-economic status?
• Demographic Effect Modifiers
  – Available evidence is insufficient to determine whether the relationship between physical activity and health effects in children ages 3 to 6 years is moderated by age, sex, race/ethnicity, or socio-economic status.
• Conduct research on the health effects of physical activity in children younger than 6 years in the following areas:
  – Randomized clinical trials to elucidate the dose-response relationships for physical activity and bone health, and for physical activity and adiposity.
  – Prospective observational and experimental studies examining the effects of physical activity on cardiometabolic risk factors, including insulin sensitivity, blood lipids, and blood pressure.
Draft Research Recommendations

– Studies to determine whether the health effects of physical activity in young children differ across groups based on sex, race/ethnicity, and socioeconomic status.
– Studies to examine the health effects of physical activity in very young children between birth and age 3 years.
– Develop valid instruments to measure physical activity in children between birth and age 2 years.
Committee Discussion

1. In children under age 6, is physical activity related to health outcomes?
   a. What is the relationship between physical activity and adiposity/weight status?
   b. What is the relationship between physical activity and bone health?
   c. What is the relationship between physical activity and cardiometabolic health?
   d. Are there dose-response relationships? If yes, what are the shapes of those relationships?
   e. Do the relationships vary by age, sex, race/ethnicity or socio-economic status?
Question #2

2. In children and adolescents, is physical activity related to health outcomes?
   a. What is the relationship between physical activity and cardiorespiratory and muscular fitness?
   b. What is the relationship between physical activity and adiposity/weight status? Does physical activity prevent or reduce the risk of excessive increases in adiposity/weight?
   c. What is the relationship between physical activity and cardiometabolic health?
   d. What is the relationship between physical activity and bone health?
   e. Do the relationships vary based on type and/or intensity of physical activity?
   f. Are there dose-response relationships? If so, what are the shapes of those relationships?
   g. Do the relationships vary by age, sex, race/ethnicity or socio-economic status?

• Source of evidence to answer question
  – SR/MA/Existing Report
**Systematic Review Question**
In children and adolescents, is physical activity related to health outcomes?

**Target Population**
Children, ages 0–18

**Comparison**
Least active subgroup

**Intervention/Exposure**
All types and intensities of physical activity, including any kind of play (structured or free), sports, and other activities

**Endpoint Health Outcomes**
- Bone density
- Bone strength
- Cardiorespiratory fitness
- Cardiometabolic risk factors
  - Blood pressure
  - Dyslipidemia
  - Glucose
  - Insulin resistance
  - Waist circumference
- Musculoskeletal health
- Obesity
- Overweight
- Weight gain
Search Results: High-Quality Reviews¹ and Reports

Identification
- PubMed database searching N = 222
- Cochrane database searching N = 112
- CINAHL database searching N = 6

Screening
- Titles screened N = 335
- Excluded based on title N = 121

Eligibility
- Abstracts screened N = 214
- Excluded based on abstract N = 109

Included
- Articles for review of full text N = 105
- Excluded based on full text N = TBD
- Studies included from supplementary strategies N = 2
- Studies included N = TBD

¹ Reviews include systematic reviews, meta-analyses, and pooled analyses.
Subcommittee Member Assignments

In children and adolescents, is physical activity related to health outcomes?

a. What is the relationship between physical activity and cardiorespiratory and muscular fitness?
   • Whitt-Glover, Hillman, Janz

b. What is the relationship between physical activity and adiposity/weight status? Does physical activity prevent or reduce the risk of excessive increases in adiposity/weight?
   • Pate, Katzmarzyk
Question 2

Subcommittee Member Assignments

In children and adolescents, is physical activity related to health outcomes?

c. What is the relationship between physical activity and cardiometabolic health?
   • Katzmarzyk, Powell

d. What is the relationship between physical activity and bone health?
   • Janz, Whitt-Glover, Hillman
Subcommittee Member Assignments

In children and adolescents, is physical activity related to health outcomes?

e. Do the relationships vary based on type and/or intensity of physical activity?

f. Are there dose-response relationships? If so, what are the shapes of those relationships?

g. Do the relationships vary by age, sex, race/ethnicity or socio-economic status?
   • Pate, Powell (e-g)
2. In children and adolescents, is physical activity related to health outcomes?
   a. What is the relationship between physical activity and cardiorespiratory and muscular fitness?
   b. What is the relationship between physical activity and adiposity/weight status? Does physical activity prevent or reduce the risk of excessive increases in adiposity/weight?
   c. What is the relationship between physical activity and cardiometabolic health?
   d. What is the relationship between physical activity and bone health?
   e. Do the relationships vary based on type and/or intensity of physical activity?
   f. Are there dose-response relationships? If so, what are the shapes of those relationships?
   g. Do the relationships vary by age, sex, race/ethnicity or socio-economic status?
3. In children and adolescents, is sedentary behavior related to health outcomes?
   a. What is the relationship between sedentary behavior and weight status/adiposity?
   b. Is there a dose-response relationship? If yes, what is the shape of the relationship?
   c. Does the relationship vary by age, sex, race/ethnicity, or socio-economic status?
   d. Is the relationship independent of light, moderate, or vigorous intensity physical activity?

• Source of evidence to answer question
  – SR/MA/Existing Report
  – De novo systematic review of original articles (TBD)
Analytical Framework

**Systematic Review Question**
In children and adolescents, is sedentary behavior related to health outcomes?

**Target Population**
Children, ages 0–18

**Comparison**
Youth who participate in varying levels and types of sedentary behavior

**Intervention/Exposure**
All types of sedentary behavior, including total sitting time, screen time, leisure-time sitting, and objective measures of sedentary time (e.g., accelerometers, heart rate monitors)

**Endpoint Health Outcomes**

- Bone density
- Bone strength
- Cardiorespiratory fitness
- Cardiometabolic risk factors
  - Blood pressure
  - Dyslipidemia
  - Glucose
  - Insulin resistance
  - Waist circumference
- Musculoskeletal health
- Obesity
- Overweight
- Weight gain
Common Inclusion/Exclusion Criteria

• Language
  – Exclude: Studies that do not have full text in English

• Publication Status
  – Include: Studies published in peer-reviewed journals, PAGAC-approved reports
  – Exclude: Grey literature

• Study Subjects
  – Exclude: Studies of animals only
Inclusion/Exclusion Criteria

- **Date of Publication**
  - Original Research: Anytime
  - Existing Sources: Include 2006–Present

- **Study Subjects**
  - Include: Children ages 0–18

- **Study Design**
  - Include: Randomized controlled trials, Non-randomized controlled trials, Prospective cohort studies, Retrospective cohort studies, Case-control studies, Before-and-after studies, Time series, Systematic reviews, Meta-analyses, Pooled analyses, PAGAC-Approved reports
  - Exclude: Narrative reviews, Commentaries, Editorials, Cross-sectional, Study protocol

- **Exposure/Intervention**
  - Include: All types of sedentary behavior
  - Exclude: Studies that do not include sedentary behavior as the primary exposure variable or used solely as a confounding variable

- **Outcome**
  - Include: Bone density, Bone strength, Cardiorespiratory fitness, Cardiometabolic risk factors (Blood pressure, Dyslipidemia, Glucose, Insulin resistance, Waist circumference), Musculoskeletal health, Obesity, Overweight, Weight gain
Search Terms: Physical Activity

Active games
Active play
Active recreation
Free play
High intensity activity(ies)
Low intensity activity(ies)
Moderate to vigorous activity(ies)
Muscle-strengthening
Outdoor play
Play and playthings
Recess

Recreational activity(ies)
Screen time
Television (TV) viewing
Television (TV) watching
Tummy Time
Video game
Video gaming
Vigorous activity(ies)
Walk
Youth sports
Search Terms: Outcome

Adiposity
Asthma
Blood glucose
Blood lipids
Blood pressure
Body composition
Body Mass Index
BMI
Bone density
Bone geometry
Bone mineral content
Bone mineral density
Cardiometabolic risk factor(s)
Diabetes Mellitus, Type 2
Dyslipidemia(s)
Fatness
Hyperglycemia
Hypertension
Insulin resistance
Metabolic syndrome
Metabolic syndrome X
Muscle mass
Musculoskeletal development
Musculoskeletal fitness
Obese
Obesity
Type 2 Diabetes
Search Results: High-Quality Reviews¹ and Reports

Identification

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N = 109

Articles for review of full text
N = 105

Excluded based on full text
N = TBD

Eligibility

Studies included from supplementary strategies
N = 1

Included

Studies included
N = TBD

¹ Reviews include systematic reviews, meta-analyses, and pooled analyses.
3. In children and adolescents, is sedentary behavior related to health outcomes?
   a. What is the relationship between sedentary behavior and weight status/adiposity?
   b. Is there a dose-response relationship? If yes, what is the shape of the relationship?
   c. Does the relationship vary by age, sex, race/ethnicity, or socio-economic status?
   d. Is the relationship independent of light, moderate, or vigorous intensity physical activity?
Next Steps

• Question 3: In children and adolescents, is sedentary behavior related to health outcomes?