



Meeting 4

Pregnancy

Lead: Ken Powell

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Experts and Consultants



Consultant:

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Work Group Questions



1. What is the relationship between physical activity and the health of the mother during pregnancy?
2. What is the relationship between physical activity and the health of the mother during postpartum (up to one year)?
3. What is the relationship between physical activity during pregnancy and the health of the child at birth?

Work Group Questions:

Rationale

- To expand on the 2008 Guidelines and better quantify the benefits (e.g., SMD or RR) of physical activity during pregnancy on selected health outcomes;
- To expand on the 2008 Guidelines and provide better information on the dose and dose-response relationship between physical activity during pregnancy and selected health outcomes;
- More specific dose and dose-response information could better inform policy makers and the public.

Analytical Framework

Systematic Review Question

Q1 - 3: What is the relationship between physical activity and (1) the health of the mother during pregnancy; (2) the health of the mother during the postpartum period (up to one year); and (3) the health of the child at birth?

Target Population

Pregnant women, post-partum mothers, and children at birth

Comparison

Pregnant women and post-partum mothers who participate in varying levels of physical activity, including no reported physical activity

Intervention/Exposure

All types and intensities of physical activity including lifestyle activities, leisure activities, and sedentary behavior

Endpoint Health Outcomes

Any health outcome, especially:

- Ease or difficulty of labor and delivery
- Excessive weight gain
- Gestational diabetes
- Lactation
- Physical fitness
- Postpartum depression
- Preeclampsia
- Preterm delivery
- Quality of life
- Return to “normal” weight
- Weight gain
- Weight status of neonate

Key Definitions

Postpartum period: Date of birth through one year after birth

Pre-term birth: Preterm is defined as babies born alive before 37 weeks of pregnancy are completed. Induction or caesarean birth should not be planned before 39 completed weeks unless medically indicated.

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



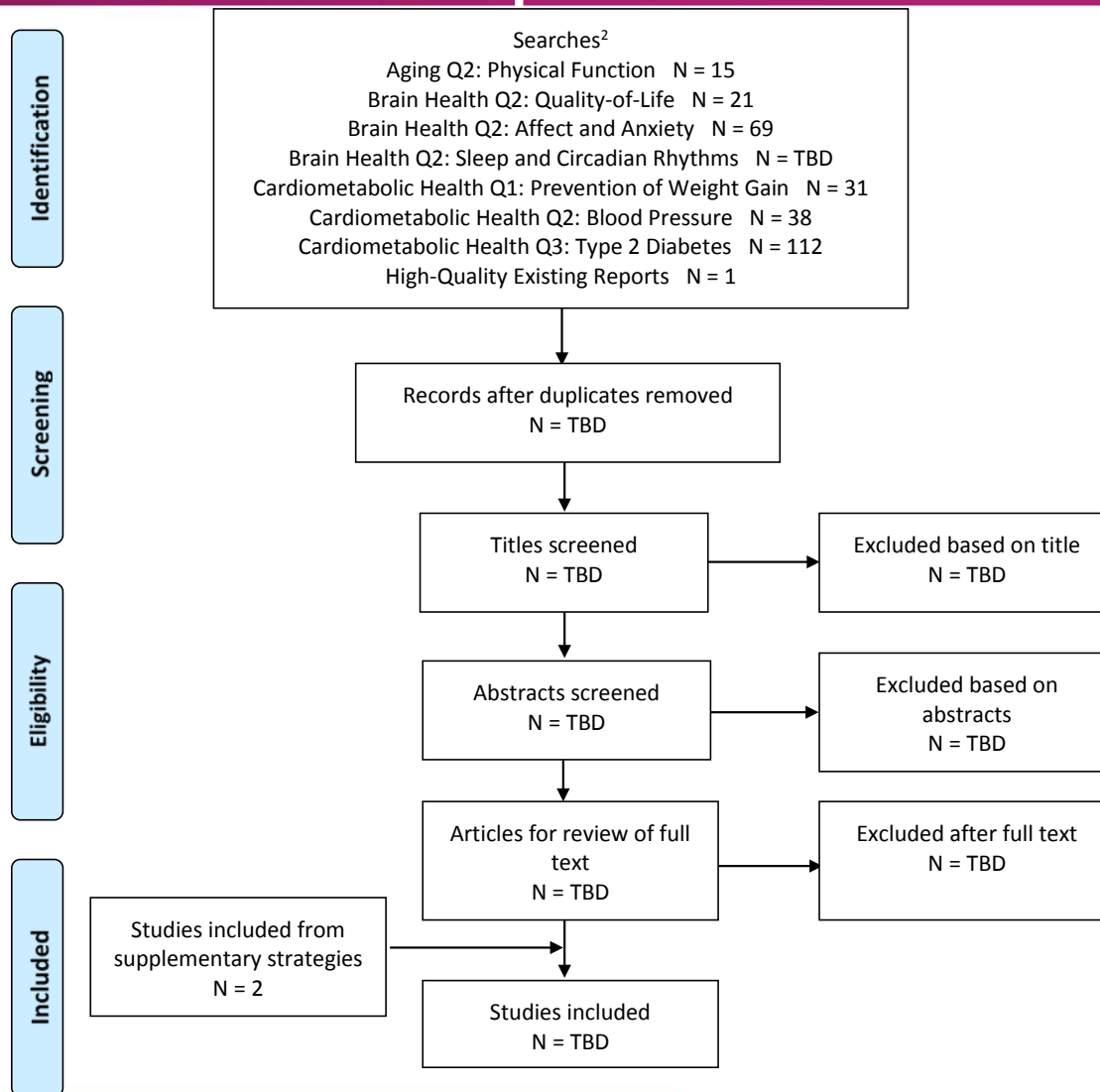
- Date of Publication
 - Original Research: Not included
 - Existing Sources: Include 2006 - Present
- Study Subjects
 - Include: Pregnant women, Postpartum mothers, and Children at birth
- Study Design
 - Include: Systematic reviews, Meta-analyses, Pooled analyses, PAGAC-Approved reports
 - Exclude: Original research, Narrative reviews, Commentaries, Editorials
- Exposure/Intervention
 - Include: All types and intensities of physical activity
 - Exclude: Missing physical activity, Therapeutic exercise, Single-acute sessions of physical activity, Physical fitness as the exposure, Physical activity only used as confounding variable
- Outcome
 - Include: Any health outcome, especially: excessive weight gain, gestational diabetes, preeclampsia, ease or difficulty of labor and delivery, return to “normal” weight after delivery, lactation, physical fitness, postpartum depression, preterm delivery, quality of life, weight status of neonate

Source of Search Results



- **Aging Q2.** What is the relationship between physical activity and physical function?
- **Brain Health Q2.** What is the relationship between physical activity and quality of life?
- **Brain Health Q3.** What is the relationship between physical activity and (1) affect and (2) anxiety?
- **Brain Health Q4.** What is the relationship between physical activity and (1) sleep and (2) circadian rhythms?
- **Weight Management Q1.** What is the relationship between physical activity and prevention of weight gain?
- **Weight Management Q2.** In people with normal blood pressure or pre-hypertension, what is the relationship between physical activity and blood pressure?
- **Weight Management Q3.** In adults without diabetes, what is the relationship between physical activity and type 2 diabetes?
- **High-Quality Existing Reports**

Search Results: High-Quality Reviews¹ and Reports



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

² The initial articles were identified by searching the titles and abstracts of each of the relevant searches' results for topics related to the Pregnancy Work Group using the terms "gestation," "pregn," and "postp."

Question 1

1. What is the relationship between physical activity and the health of the mother during pregnancy?
 - Is physical activity related to **excessive weight gain**, gestational diabetes, preeclampsia, quality of life, physical fitness, ease of labor and delivery, and musculoskeletal injury during pregnancy?
 - If yes, what dose of physical activity is associated with the reported quantitative benefit or risk?
 - Is there a dose-response relationship? If yes, what is the shape of the relationship?
 - Does the relationship vary by age, ethnicity, socio-economic status, or weight status?
- Source of evidence to answer question
 - SR/MA/Existing Report

Draft Key Findings: Gestational Weight Gain

- A total of 11 systematic reviews and meta-analyses have addressed the relationship between physical activity and gestational weight gain (GWG) and *they provide strong evidence of a significant, but modest, inverse relationship* between physical activity and gestational weight gain:
 - Based on a meta-analysis of 18 RCTs of 1598 women performing a structured exercise program and 1605 receiving standard care, the standardized mean difference in gestational weight gain was -1.11 kg (95% CI = -1.59 to -0.69), with women in the exercise group gaining less weight than women receiving standard care.
 - Other meta-analyses of RCTs reported remarkably similar standardized mean differences in GWG between exercising and control women, ranging from -0.36 kg (95% CI= -0.64 to -0.09) to -1.50 kg (95% CI=-2.08 to -0.92).

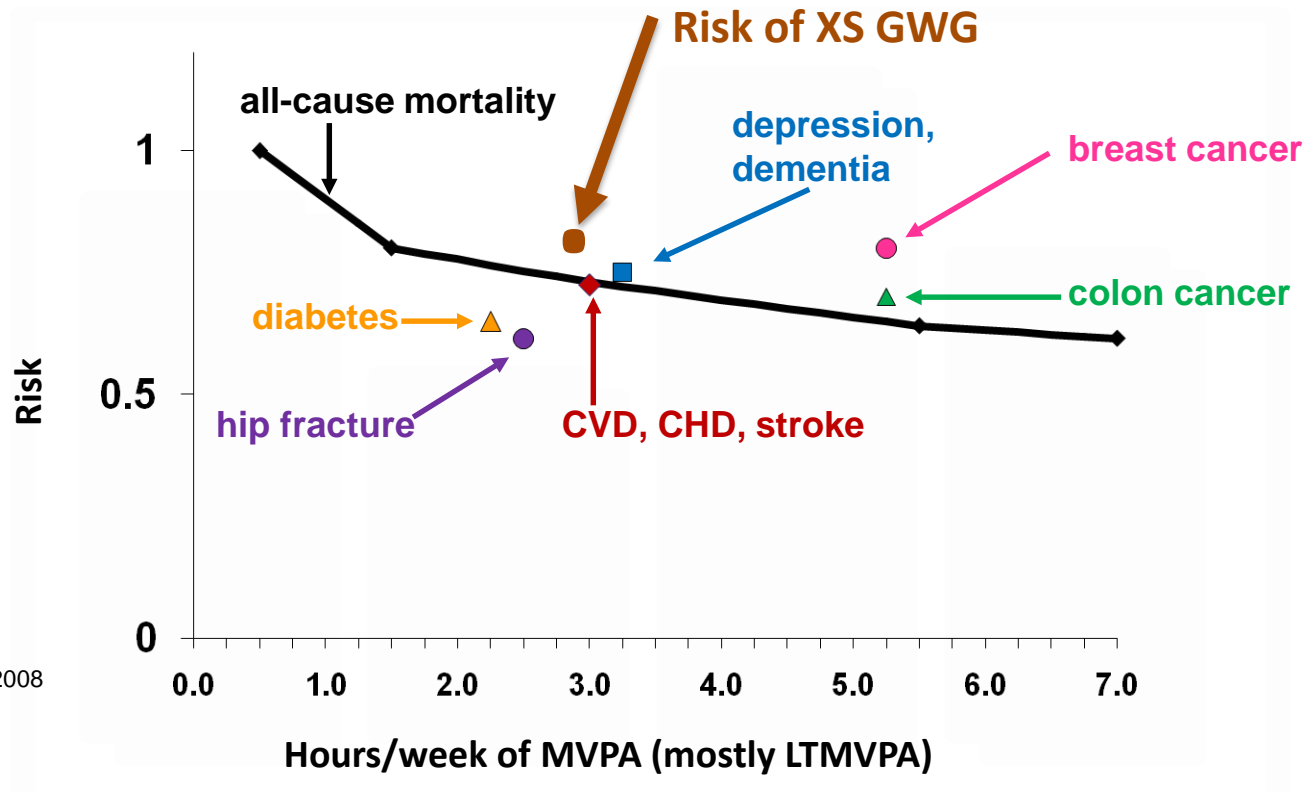
Draft Key Findings: Gestational Weight Gain

- An alternative outcome measure is meeting IOM Guidelines for weight gain during pregnancy:
 - Normal weight: 11.5 to 16 kg (25 to 35 lbs)
 - Overweight: 7 to 11.5 kg (15 to 25 lbs)
 - Obese 5 to 9 kg (11 to 20 lbs)
- In general, women who reported physical activity during pregnancy experienced a significantly lower risk of excess weight gain compared with women who did not, with pooled effect sizes ranging from an 18% (OR=0.82; 95% CI=0.68 to 0.99) to a 23% (OR=0.77; 95%CI=0.66 to 0.88) lower risk.

Draft Key Findings: Gestational Weight Gain - Dose

- The dose of physical activity prescribed in the RCTs varied among studies. Similarly, the assessment and categorization of reported LTPA was not consistent.
- However, most RCT interventions used an exercise regimen involving primarily aerobic activity of moderate-intensity (walking, swimming, aerobic exercise), occurring at least 3 times per week for a duration of 30-60 min per bout.
- This dose of activity is consistent with both ACOG Guidelines and the 2008 Physical Activity Guidelines Recommendations.

Dose and dose-response curves



Data from PAGAC Report 2008
Figure published in
Ann Rev Public Health
2011;32:349-365

Draft Key Findings: Gestational Weight Gain – Dose-Response

- Most of the reviews did not assess whether there was a dose-response relationship between maternal physical activity and gestational weight gain.
- The one review that attempted to answer this question (McDonald, 2016) reported that prescribed doses of exercise in the RCTs did not differ between those interventions observing significant ($p < 0.05$) differences in weight gain between the exercise and control groups and those that did not; however, adherence to the prescribed exercise program was significantly higher in the “successful” interventions.
- Wiebe (2015) also reported that among all eligible trials in the review, the standard mean difference in GWG between the exercise and control groups was moderately and inversely correlated with both the duration (in weeks) of the intervention ($r = -0.51$; $p = 0.023$) and the volume (hrs/week) of exercise prescribed ($r = -0.45$; $p = 0.05$).

Draft Key Findings: Gestational Weight Gain – Effect Modification



- Virtually, none of the systematic reviews or meta-analyses assessed whether the purported relationship between physical activity and GWG varied by age, race/ethnicity, or socio-economic status.
- With regard to weight status, we observed that most of the findings were reported among women of normal weight; however, several systematic reviews (McDonald, 2016; Muktabhant, 2015; Sui, 2012; and Wiebe, 2015) stratified their data by weight status (i.e., normal weight, overweight, or obese). These studies tended to observe larger effect sizes among women of normal weight, compared with those who were overweight or obese.
- In contrast, one review of exclusively overweight or obese women (Sui 2012) reported a greater standardized mean difference in GWG between the exercise and control groups among obese women (SMD=-0.91 kg; 95% CI=-1.66 to -0.16) compared with overweight (SMD=-0.12; 95% CI= -0.52 to 0.26) women.

Draft Conclusion Statement

- Strong evidence demonstrates a significant, but modest, inverse relationship between physical activity and gestational weight gain. **PAGAC Grade: Strong**
- Limited evidence suggests that a dose of physical activity consistent with the 2015 ACOG Guidelines and the 2008 U.S. Physical Activity Guidelines (150-180 min/week of moderate-intensity activity) is associated with minimized weight gain and a lower risk of excess gestational weight gain. **PAGAC Grade: Limited**
- Insufficient evidence is available to determine whether there is a dose-response relationship between physical activity and gestational weight gain. **PAGAC Grade: Grade not assignable.**
- Insufficient evidence is available to determine whether the relationship between physical activity and gestational weight gain varies by age, race/ethnicity, socio-economic status, or weight status. **PAGAC Grade: Grade not assignable.**

Draft Research Recommendations

- Conduct longitudinal research on varying exposure levels of physical activity to allow for an enhanced understanding of the dose-response associations between physical activity and gestational weight gain across a wider spectrum of exposure.
- Conduct large research trials with ample sample sizes to allow for stratum-specific analyses to determine whether the influence of physical activity on GWG varies by age, race/ethnicity, socio-economic status, or initial weight status.

Committee Discussion



1. What is the relationship between physical activity and the health of the mother during pregnancy?
2. What is the relationship between physical activity and the health of the mother during the postpartum period (up to one year)?
3. What is the relationship between physical activity during pregnancy and the health of the child at birth?