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The Impact of Outdoor Physical Activities on the Health of Pregnant Women: A Scoping Review

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 18 February 2026 and was last updated on 18 February 2026.

INTRODUCTION

Review question / Objective This scoping review aims to map and synthesize existing research on outdoor physical activity and nature-based environmental exposure during pregnancy and their associations with maternal health outcomes. Specifically, the review will address: (1) what associations have been reported between outdoor physical activity and metabolic, cardiovascular, mental health, and pregnancy-related outcomes among pregnant women; and (2) which motivational factors and barriers influence engagement in outdoor physical activity during pregnancy. The review question can be framed using the PCC elements as follows: Population – pregnant women at any gestational age; Concept – outdoor physical activity and nature-based environmental exposure; Context – community, clinical, and public health settings across different countries and income levels.

Background Physical activity during pregnancy is widely recognized as an important determinant of maternal and fetal health, with established benefits for metabolic, cardiovascular, and psychological outcomes. However, most guidelines and interventions have focused on exercise performed in controlled or indoor environments, and have not clearly distinguished between indoor and outdoor activity. At the same time, research on environmental determinants of health suggests that exposure to green and blue spaces, walkable neighborhoods, and natural light may confer additional benefits beyond those of exercise alone. These dual pathways – behavioral activation through movement and environmental exposure through natural settings – are particularly relevant in pregnancy, a period characterized by physiological and psychosocial vulnerability and by frequent declines in physical activity levels. Despite increasing evidence that outdoor environments shape physical activity patterns and health outcomes in pregnant women, the literature

remains fragmented across disciplines and study designs. A scoping review is therefore needed to systematically map this heterogeneous evidence base.

Rationale Existing reviews of physical activity in pregnancy have primarily addressed overall activity levels, safety, and clinical outcomes, without focusing on the specific contribution of outdoor settings and nature-based exposure. Heterogeneity in exposure definitions (e.g., structured outdoor programs, self-reported outdoor activity, residential greenness, walkability indices) and outcome measures has made it difficult to draw clear conclusions or to inform practice and policy. A scoping review is the most appropriate methodological approach to capture the breadth and diversity of this emerging field, to clarify how outdoor physical activity and environmental exposure have been operationalized, and to identify key evidence gaps. By mapping the available evidence, this review will support the development of future intervention trials, refine recommendations for pregnancy-safe outdoor activity, and inform urban and public health strategies that aim to promote maternal health through supportive environments.

METHODS

Strategy of data synthesis We will conduct a comprehensive literature search in the following electronic databases: PubMed, Scopus, Web of Science Core Collection, and ScienceDirect. Google Scholar will be used as a supplementary source to identify additional records not captured through database indexing, and reference lists of included studies will be screened manually. Search strategies will combine controlled vocabulary (e.g., MeSH terms in PubMed) and free-text terms related to pregnancy (“pregnancy”, “pregnant women”), physical activity (“physical activity”, “exercise”, “walking”, “green exercise”), outdoor or environmental exposure (“outdoor”, “green space”, “greenness”, “blue space”, “nature-based”), and maternal health outcomes (“maternal health”, “gestational diabetes”, “hypertensive disorders”, “mental health”, “birth outcomes”). Searches will be limited to peer-reviewed articles in English, published between January 2013 and December 2025. Identified studies will be charted using a standardized data extraction form, and results will be synthesized descriptively, using narrative summaries and tabular presentations organized by exposure type, outcome domain, and study design.

Eligibility criteria Eligibility criteria will be defined using PCC (Population, Concept, Context).

Population: Pregnant women at any gestational age. Studies including mixed samples will be eligible if data for pregnant women can be identified.

Concept: Outdoor physical activity and nature-based environmental exposure, including structured outdoor exercise programs (e.g., walking programs), habitual outdoor physical activity, and environmental proxies such as residential greenness, access to green or blue spaces, and neighborhood walkability, when these are linked to physical activity or mobility.

Context: Any setting (community, clinical, urban, rural) and any country.

Types of evidence: Original peer-reviewed studies of any design, including randomized controlled trials, quasi-experimental studies, cohort and case-control studies, cross-sectional studies, pilot studies, case reports or case series, and qualitative studies.

Outcomes: Physical and mental health outcomes during pregnancy, including metabolic (e.g., gestational diabetes, glycemic control, gestational weight gain), cardiovascular or hypertensive outcomes (e.g., blood pressure, preeclampsia), mental health (e.g., stress, anxiety, depression), and pregnancy/birth outcomes (e.g., preterm birth, mode of delivery, neonatal outcomes).

Exclusion: Studies focusing exclusively on indoor physical activity, studies without health-related outcomes during pregnancy, non-original publications (systematic reviews, scoping reviews, meta-analyses, editorials, commentaries, conference abstracts without full text, guidelines, protocols, theses, dissertations, and other grey literature), and studies not published in English.

Source of evidence screening and selection All records retrieved from database searches will be imported into reference management software and duplicates will be removed. Two reviewers will independently screen titles and abstracts against the predefined eligibility criteria. Potentially relevant articles will be obtained in full text and assessed independently by the same reviewers. Any disagreements at either stage will be resolved through discussion; if consensus cannot be reached, a third reviewer will be consulted. The study selection process will be documented in a PRISMA-ScR flow diagram, including reasons for exclusion at the full-text stage.

Data management A standardized data charting form will be developed in a spreadsheet or word-processing software and pilot-tested on a subset of studies to ensure clarity and consistency. One

reviewer will extract data on study characteristics, population, exposure definition, context, outcomes, and key findings, and a second reviewer will verify all extracted information against the original articles. Any discrepancies will be discussed and resolved by consensus. Data will be stored in secure, backed-up files accessible only to the review team.

Reporting results / Analysis of the evidence

Data will be summarized using descriptive statistics (e.g., counts and proportions for study designs, countries, exposure types, and outcome domains) and narrative synthesis. Results will be organized around key domains such as type of outdoor exposure (structured programs, habitual activity, environmental proxies), outcome categories (metabolic, cardiovascular, mental health, pregnancy/birth outcomes), and methodological features. Where appropriate, we will highlight consistencies and discrepancies between studies, note methodological limitations, and identify gaps in the evidence. No meta-analysis is planned, given the expected heterogeneity of exposures and outcomes.

Presentation of the results Results will be presented in tables and figures summarizing the characteristics and findings of included studies. Planned tables include: (1) a table of study characteristics (author, year, country, design, sample size, gestational timing, exposure definition); (2) a table summarizing outcome domains and main findings by exposure type; and (3) a table reporting methodological quality assessment scores for each study. A PRISMA-ScR flow diagram will illustrate the study selection process. Narrative text will accompany these tables to contextualize and interpret the findings.

Language restriction Yes, English only.

Country(ies) involved Serbia.

Keywords pregnancy; outdoor physical activity; green exercise; gestational diabetes; mental health; scoping review.

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