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Association Between Heavy Lifting - Recreational and Occupational - and Pregnancy Outcomes: a literature review

Joanna Mioduszevska

Medical University of Lublin, Aleje Raławickie 1, 20-059 Lublin, Poland

asia.mioduszevska01@gmail.com

<https://orcid.org/0009-0001-1024-1217>

Paweł Rot

Medical University of Lublin, Aleje Raławickie 1, 20-059 Lublin, Poland
pawel_rot@outlook.com

<https://orcid.org/0009-0004-4140-4463>

Piotr Poniewozik

Medical University of Lublin, Aleje Raławickie 1, 20-059 Lublin, Poland
piotr.poniewozik01@gmail.com

<https://orcid.org/0009-0001-6350-4981>

Natalia Dziuba

Medical University of Lublin, Aleje Raławickie 1, 20-059 Lublin, Poland
nat.dziuba@gmail.com

<https://orcid.org/0009-0002-4719-9208>

Aleksandra Sim

Medical University of Lublin, Aleje Raławickie 1, 20-059 Lublin, Poland
misardnaskela@gmail.com

<https://orcid.org/0009-0001-6475-4595>

Maja Pernal

Medical University of Lublin, Aleje Raławickie 1, 20-059 Lublin, Poland
pernalmaja@gmail.com

<https://orcid.org/0009-0003-9616-2361>

Zofia Roguska

Medical University of Lublin, Aleje Raławickie 1, 20-059 Lublin, Poland
zosia.roguska@gmail.com

<https://orcid.org/0009-0007-8588-2784>

Andrzej Pawel Zuzak

Medical University of Lublin, Aleje Raławickie 1, 20-059 Lublin, Poland
andrzejzuzak1@gmail.com

<https://orcid.org/0009-0008-6578-1457>

Paweł Poniewozik

Medical University of Lublin, Aleje Raławickie 1, 20-059 Lublin, Poland
poniewozikpawel01@gmail.com

<https://orcid.org/0009-0006-2057-2219>

Krzysztof Grabowski

Dr. Tytus Chałubiński Radom Specialist Hospital, Adolfa Tochtermana 1 Street, 26-610
Radom, Poland krzysztofgrabowski444@gmail.com

<https://orcid.org/0009-0004-1482-7188>

Abstract

Background: For years, pregnant women were told to avoid heavy lifting and high-intensity movement. However, current research shows the distinction between different types of physical load. While recreational lifting and strength training offer positive health

benefits, repetitive heavy lifting in a workplace setting can lead to negative clinical outcomes.

Aim: The aim of this review is to evaluate the association between heavy lifting - both occupational and recreational - and various pregnancy outcomes, including preterm birth, fetal growth, and maternal health, based on recent clinical literature.

Methodology: A review of clinical guidelines and meta-analyses from 2016–2025 was conducted using PubMed and Google Scholar.

Results: Findings indicate that occupational lifting (repetitive loads >10–15 kg) is associated with a modest increase in preterm birth and miscarriage risk, particularly when combined with prolonged standing. In contrast, recreational heavy resistance training (HRT) showed no significant correlation with adverse neonatal outcomes or pelvic floor dysfunction. Furthermore, structured exercise significantly reduces the incidence of gestational diabetes and hypertensive disorders.

Conclusions: The impact of lifting is context dependent. Occupational strain requires ergonomic intervention, while structured, voluntary strength training is safe and protective for maternal health.

Keywords: Pregnancy, Heavy lifting, Resistance training, Preterm birth, Occupational health, Physical activity.

Introduction

Pregnancy is a unique physiological state characterized by profound anatomical, metabolic, and hormonal adaptations that support fetal development while maintaining maternal health. Prenatal care topic has undergone

a radical transformation, shifting from viewing pregnancy as a state of "delicate health" to recognizing physical activity as a fundamental clinical recommendation [1, 2]. While modern science identifies sedentary behavior as a significant risk factor, a critical distinction must be made between recreational exercise and occupational physical strain. Unlike structured resistance training, which can be tailored and self-paced to improve maternal metabolic health, heavy lifting in the workplace often involves repetitive, mandatory stress with inadequate recovery [3, 4, 5]. This review synthesizes current literature to bridge the gap between clinical evidence and public practice, providing

evidence-based guidance to distinguish between beneficial fitness programs and potentially hazardous occupational exposures.

Methodology

This review was conducted by searching the PubMed, Google Scholar, and ResearchGate databases for studies published between 2012 and 2025. The search focused on keywords including "pregnancy," "physical activity," "heavy lifting," "occupational lifting" and related terms. Inclusion criteria targeted systematic reviews, meta-analysis, and clinical guidelines that evaluate maternal and neonatal health outcomes.

Inclusion Criteria

The following criteria were used for the inclusion of sources to ensure a high-quality and relevant literature base:

Study Design: Systematic reviews, meta-analyses, and large-scale cohort studies

Peer-Reviewed Publications: Only articles published in reputable, peer-reviewed academic journals were included to ensure the quality and validity of the research. This criterion was essential for maintaining the academic integrity of the review.

Publication Date: The temporal scope was limited to publications between 2012 and 2025. This ensured that the review would be based on recent and contemporary research findings, reflecting the current state of knowledge in the selected field.

Outcomes: Both maternal (e.g., gestational diabetes, hypertensive disorders, musculoskeletal health) and neonatal outcomes (e.g., birth weight, preterm delivery, labor course).

Exclusion Criteria

Exclusion criteria primarily targeted studies focusing solely on low-intensity aerobic exercise without a lifting component or articles lacking peer-reviewed empirical data.

Data Extraction and Synthesis

Data extracted from the included studies comprised:

Study design and population characteristics

Type and intensity of physical activity or occupational workload

Exposure definition (e.g., weight lifted, frequency, duration)

Reported maternal and neonatal outcomes

Given the heterogeneity in study designs, exposure definitions, and outcome measures, a meta-analysis was not performed. Instead, a narrative synthesis was conducted, comparing

findings across occupational and recreational contexts. Differences in exposure patterns, intensity, and environmental conditions were considered when interpreting results.

Benefits of Recreational Heavy Lifting in Pregnancy

Strength training during pregnancy delivers various benefits – both physical and mental – for maternal health and fetus.

One of the most significant benefits of prenatal exercise is the regulation of maternal metabolism. Gestational Diabetes Mellitus (GDM) is a growing global concern, linked to childhood obesity and long-term metabolic issues for the mother. Maintaining a healthy weight during the second and third trimesters is the most effective way to prevent GDM [6]. Exercise improves insulin sensitivity and glucose uptake in skeletal muscle, which provides a natural buffer against the hormonal changes of pregnancy that typically induce insulin resistance [7].

Musculoskeletal health: Strength training may help maintain or improve muscular strength to cope with the increasing physical demands of pregnancy. Strong core and pelvic floor muscles may provide better support for the growing uterus and help maintain spinal alignment [8, 9].

Birth Weight: Data indicates that prenatal exercise does not lead to a reduction in birth weight; instead, it promotes a homeostatic effect on fetal growth [10, 11]. Specifically, regular activity significantly reduces the risk of macrosomia (excessive birth weight) without increasing the incidence of infants born small for gestational age (SGA) [10]. This is a key point for the heavy lifting discussion because it proves that lifting weights doesn't get in the way of a baby's growth [8]. It clears up the old fear that working out hard might take away energy or nutrients the baby needs to develop properly. As long as the exercise is planned right, the baby continues to grow at a healthy, normal rate [9].

Functional capacity: Functional capacity during pregnancy is an important outcome of maintaining muscular strength, particularly through resistance training. As pregnancy progresses, physiological and biomechanical changes – such as increased body mass, altered posture, and reduced joint stability – make everyday activities more physically demanding [2, 12, 13]. Maintaining strength helps women better adapt to these changes and preserve independence in daily functioning.

Evidence shows that improved strength, especially in the core and lower body, facilitates routine tasks like walking, lifting, and carrying, while reducing fatigue and musculoskeletal discomfort, including low back pain [8, 9, 13]. Better postural control and balance are also important, as shifts in the center of gravity increase the risk of instability during pregnancy [2].

Cardiovascular benefits: Structured recreational heavy lifting during pregnancy offers significant cardiovascular benefits as it promotes vascular health and reduces systemic inflammation which effectively lowers the risk of developing gestational hypertension or preeclampsia [11, 14, 15] whereas on the other hand occupational physical strain involving repetitive mandatory lifting often leads to increased hypertensive risks [3, 16] due to the fact that the lack of recovery and high workplace stress triggers a chronic sympathetic response rather than a healthy physiological adaptation [4, 5].

Psychological well-being: It's an important component of maternal health. Growing evidence indicates that physical activity during pregnancy plays a protective role against mental health disorders, particularly postpartum depression [11, 17]. Regular exercise has been shown to improve mood, reduce anxiety, and enhance overall emotional stability through both physiological and psychosocial mechanisms. These include the release of endorphins, improved sleep quality, and a greater sense of self-efficacy and control during pregnancy. Although most research has focused on aerobic exercise, emerging evidence suggests that resistance training may offer comparable psychological benefits [8, 9]. In addition, structured exercise-regardless of type-can provide routine and promote positive health behaviors, both of which are associated with improved mental wellbeing [11, 17].

Labor and Delivery Outcomes: Active women had shorter labor durations and a reduced need for Cesarean sections. Being physically prepared also helps the recovery process, making it shorter [12, 13, 18].

Risks and Considerations

Cardiovascular and Hemodynamic Changes: Pregnancy induces profound cardiovascular adaptations that may influence the physiological response to heavy lifting. Blood volume increases by 40-50% by the third trimester, cardiac output rises substantially, and peripheral vascular resistance decreases. These changes support fetal growth and development but also alter the cardiovascular response to acute physical exertion [1, 2]. Heavy lifting, particularly when involving the Valsalva maneuver, can cause acute spikes in intra-abdominal and intrathoracic pressure. This may temporarily reduce venous return and cardiac output, potentially affecting uteroplacental blood flow. However, the clinical significance of these transient hemodynamic changes in healthy pregnancies remains uncertain, and the developing fetus appears to have considerable resilience to brief reductions in oxygen delivery [8, 9].

Musculoskeletal and Biochemical Changes: Pregnancy is characterized by substantial musculoskeletal adaptations including increased ligamentous laxity (mediated by relaxin and other hormones), altered center of gravity, increased lumbar lordosis, and changes in load distribution across joints. These changes may increase susceptibility to musculoskeletal injury during lifting activities, particularly when performed with suboptimal technique or excessive loads [1, 2].

The anterior shift in the center of gravity as pregnancy progresses may compromise balance and lifting mechanics, potentially increasing the risk of falls or strain injuries. Additionally, the separation of the rectus abdominis muscles (diastasis recti) that commonly occurs during pregnancy may affect the ability to generate and transmit force through the trunk during lifting activities [2, 9].

Pelvic Floor Considerations: The pelvic floor musculature undergoes significant stress during pregnancy due to the increasing weight of the gravid uterus and hormonal changes affecting connective tissue properties. Heavy lifting generates increases in intra-abdominal pressure that are transmitted to the pelvic floor. Concerns have been raised that repetitive high-pressure loading might contribute to pelvic floor dysfunction or prolapse, though evidence supporting this relationship remains limited [1, 8, 9].

Risk of Preterm Birth: Research shows a clear link between heavy lifting at a job and giving birth too early (preterm birth). While the risk is not huge for every individual, it is consistent across many large studies. Scientists found that women who have to lift heavy objects at work are about 20% to 30% more likely to have a preterm birth. This risk is even higher if the woman has to lift heavy things many times a day. The main reason for this is likely the "chronic stress" of a physical job, which doesn't allow the body to rest and recover the same way a workout does [3, 4, 19].

Low Birth Weight and Fetal Growth Restriction: Recent studies show that high physical demands at work can negatively affect how a baby grows. Research highlights that women in physically taxing jobs especially those involving heavy lifting face a higher risk of having smaller infants or babies with lower birth weights. These effects are often strongest when lifting is combined with other workplace stresses, such as standing for long periods or working irregular shifts. However, experts note that it is difficult to isolate lifting as the only cause, since physical jobs usually involve a mix of several factors that can collectively impact fetal health [16, 20].

Gestational Hypertensive Disorders: Evidence regarding occupational lifting and gestational hypertensive disorders is less consistent than for preterm birth or low birth weight. Some studies have found associations between physically demanding

work and increased risk of preeclampsia, while others have not observed significant relationships. The mechanisms by which heavy lifting might influence hypertensive disease risk are not well established, though proposed pathways include effects on endothelial function, oxidative stress, and inflammatory responses. On the other hand, recreational heavy lifting and exercises during pregnancy may prevent hypertensive disorders by improving vascular function and reducing systemic inflammation [6, 14, 16].

The Safety Profile of Structured Strength Training in Pregnancy

It is important to distinguish structured recreational exercise from occupational exposure, as research shows they carry very different risk profiles. Unlike workplace lifting, recreational training allows women to control their intensity, ensure adequate recovery between sessions, and focus on proper technique without the added stress of a long workday or prolonged standing. A landmark study by Prettet et al. (2023) [8] in the *International Urogynecology Journal* found no evidence that heavy resistance training (even at high intensities) leads to adverse pregnancy outcomes or pelvic floor issues like incontinence or prolapse. Furthermore, a systematic review by Demel et al. (2025) [9] in *Quality in Sport* concluded that programmed strength training is safe and provides significant benefits, such as maintaining muscle strength, reducing back pain, and potentially improving labor outcomes [8, 9, 19].

Educational and Practical Recommendations

Educational and practical recommendations regarding heavy lifting during pregnancy must be grounded in a comprehensive assessment of the woman's pre-pregnancy fitness and her specific occupational demands to ensure maternal and fetal safety [4, 5, 21].

Healthcare providers should implement systematic screening to distinguish between recreational strength training, which is generally associated with positive health outcomes like reduced risk of gestational diabetes and postpartum depression, and repetitive occupational lifting, which is linked to adverse outcomes such as preterm birth and fetal growth restriction [6, 16, 17, 20].

For those engaging in recreational resistance training, practical guidance should focus on avoiding the Valsalva maneuver to prevent excessive intra-abdominal pressure and monitoring intensity through the "talk test" or perceived exertion scales rather than heart rate alone [7, 8, 9]. It is equally vital to emphasize pelvic floor protection and the maintenance of proper thermoregulation and hydration, particularly during high-intensity sessions [7, 8, 19].

In the occupational sphere, recommendations should prioritize workplace modifications, such as reducing the total weight lifted per shift, implementing mandatory sitting breaks to support uterine blood flow, and adjusting ergonomic techniques to accommodate the body's shifting center of gravity and increased ligamentous laxity [4, 5, 19, 20].

Educational interventions must be multidisciplinary, involving obstetricians, midwives, and physiotherapists to provide consistent messaging that bridges the gap between clinical research and patient behavior [4, 22]. These programs should not only manage psychological barriers by highlighting the mental health benefits of activity but also integrate nutritional counseling to manage weight gain effectively [6, 17, 22]. Finally, education must extend into the postpartum period, guiding women through a gradual and staged reintroduction to heavy loads that allows for the full recovery of the abdominal and pelvic floor structures [7, 8].

Future Research Directions

While we have learned a lot about how heavy lifting affects pregnancy, there are still several areas that need more study to give women the best advice. First, research methods need to improve; many current studies on workplace lifting rely on what people remember or their job titles, which can be inaccurate [4, 5]. Future studies should use tools to measure exactly how much and how often a person lifts to get better data, especially since recent nationwide cohort studies have shown that even moderate occupational lifting may increase the risk of adverse outcomes like preterm birth [4, 16, 20]. Furthermore, researchers should work toward a standardized definition of "heavy lifting," as current studies vary wildly in what they consider a dangerous weight. Without a universal limit, it remains difficult to create clear clinical guidelines that apply to every workplace. We also need more trials that test how effective workplace changes like lighter duties or scheduled rest breaks really are at keeping moms and babies safe from the growth issues and pre-eclampsia linked to high physical strain [19, 21]. For women who lift weights for exercise, we need long-term studies that follow large groups of people to confirm the safety of high-intensity training, as current evidence suggests it may not negatively affect birth weight or maternal health in women who are already fit [8, 10, 11].

Future research should also focus on specific groups that are often overlooked, such as competitive strength athletes and women with high-risk pregnancies, to provide more personalized safety rules instead of general warnings [9, 14, 21]. Moreover, it's vital to

investigate how heavy lifting interacts with other stressors, such as nutritional intake and psychological fatigue, to see if these factors make lifting more or less risky [22]. It is also important to study more diverse groups of people, as most current research comes only from Europe and North America [4, 22]. Finally, scientists need to look closer at the specific biological ways the body reacts to heavy lifting, such as how it affects placental blood flow or the course of labor [3, 12, 18]. This includes long-term checks on pelvic floor health to answer important questions about whether lifting heavy weights recreationally or at work causes any lasting issues like incontinence after birth [7, 8, 19]. Finally, exploring the psychological benefits of strength training versus the mental toll of forced occupational labor could help us understand why one type of lifting seems to improve well-being while the other may increase stress and complications [11, 17].

Conclusions

The link between heavy lifting and pregnancy outcomes is context-dependent. Current evidence supports the following conclusions:

The most significant finding is that occupational heavy lifting, especially when frequent and combined with prolonged standing or shift work, is associated with a modestly increased risk of preterm birth and low birth weight. In contrast, structured recreational resistance training does not share this risk profile. The reason of that is recreational exercise is performed in discrete sessions with adequate recovery and individual control over intensity, it serves as a healthy physiological stimulus rather than a source of chronic stress.

When properly managed, physical activity during pregnancy-including heavy lifting-offers profound health benefits. It acts as a preventive measure against gestational diabetes, hypertensive disorders, excessive weight gain, and postpartum depression. Furthermore, active women tend to experience shorter labors and improved musculoskeletal resilience, which aids in a faster postpartum recovery.

Additionally, strength training supports the maintenance of muscular strength needed to cope with the increasing physical demands of pregnancy. Improved trunk stability and pelvic support may help maintain proper posture and reduce strain associated with anatomical changes such as increased lumbar lordosis and shifting center of gravity. Maintaining functional capacity also enables women to perform daily activities more efficiently and prepare for the physical demands of labor and postpartum childcare.

Finally, while medical guidelines encourage staying active during pregnancy for women without contraindications, they do not give exact rules for heavy lifting. This means healthcare providers should give personalized advice based on each patient's circumstances, distinguishing between occupational exposures and recreational exercise. This balanced approach supports a mother's health while lowering risks at work. As we learn more from new research, these recommendations will become even more precise, helping ensure the best results for both mother and baby.

In particular, practical recommendations should emphasize proper technique, avoidance of the Valsalva maneuver, and monitoring of exercise intensity using subjective measures such as perceived exertion. At the same time, occupational interventions such as reducing total lifting load, introducing rest breaks, and improving ergonomics are essential to minimize risk. This dual approach reflects the need to both promote beneficial physical activity and reduce harmful exposures.

Disclosure:

Author Contribution Statement

Conceptualization: Joanna Mioduszevska, Aleksandra Sim, Paweł Rot, Natalia Dziuba

Methodology: Joanna Mioduszevska, Andrzej Zuzak, Zofia

Roguska Formal analysis: Maja Pernal, Piotr Poniewozik

Investigation: Joanna Mioduszevska, Aleksandra Sim, Paweł Rot, Natalia Dziuba, Andrzej Zuzak, Piotr Poniewozik, Paweł Poniewozik, Zofia Roguska, Maja Pernal, Krzysztof Grabowski

Resources: Joanna Mioduszevska

Data curation: Joanna Mioduszevska, Zofia Roguska, Andrzej Zuzak, Krzysztof Grabowski

Writing - rough preparation: Joanna Mioduszewska, Aleksandra Sim, Paweł Rot, Natalia Dziuba, Andrzej Zuzak, Piotr Poniewozik, Paweł Poniewozik, Zofia Roguska, Maja Pernal, Krzysztof Grabowski

Writing–review and editing: Joanna Mioduszewska, Paweł Poniewozik, Paweł Rot

Visualization: Aleksandra Sim, Maja Pernal

Supervision: Joanna Mioduszewska, Natalia Dziuba, Paweł Rot

Project administration: Joanna Mioduszewska

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