

Physical activity during pregnancy — the state of Polish women's knowledge

Alicja Szatko¹, Joanna Kacperczyk-Bartnik², Paweł Bartnik², Ewelina Mabilia¹,
 Martyna Goryszewska¹, Agnieszka Dobrowolska-Redo², Ewa Romejko-Wolniewicz²

¹Students' Scientific Group affiliated to 2nd Department of Obstetrics and Gynaecology, Medical University of Warsaw, Poland

²2nd Department of Obstetrics and Gynaecology, Medical University of Warsaw, Poland

ABSTRACT

Objectives: Regular and moderate physical activity during uncomplicated pregnancy has been considered beneficial for both the expectant mother and her unborn child. It reduces the risk of gestational diabetes mellitus (GDM) and preeclampsia.

The aim of the study was to assess women's knowledge concerning specific aspects of physical activity during uncomplicated pregnancy.

Material and methods: A cross-sectional survey study on a sample of Polish women in a tertiary referral centre was performed. A questionnaire that was validated in the Polish language was based on the Committee Opinion of American College of Obstetricians and Gynaecologists, which was published in December 2015. Sociodemographic parameters in relation to specific aspects of physical activity during pregnancy were analysed.

Results: A total of 259 (92.5%) women were aware of the beneficial impact of physical activity on the course of pregnancy. Higher education was associated with greater awareness ($p = 0.001$). Regarding the optimal frequency and recommended duration of exercise, the overall rates of correct answers were only 106 (38.1%) and 167 (59.6%), respectively. The most common sources of information on physical activity during pregnancy were the Internet (81, 50.0%) and books (62, 38.3%). Doctors and midwives instructed the respondents only in 36 (22.4%) and 31 (18.9%) cases, respectively.

Conclusions: Women's knowledge about physical activity during pregnancy seems satisfactory. However, awareness concerning the optimal duration and frequency of exercise, as well as recommended voluntary activities during pregnancy, should be improved. Medical professionals may also reinforce their role as a provider of reliable information, resulting in the prevention of many pregnancy complications.

Key words: pregnancy; exercise; gestational diabetes; pre-eclampsia

Ginekologia Polska

INTRODUCTION

Physical inactivity is proven to be the fourth-leading risk factor for early mortality worldwide [1]. A regular exercise programme should be maintained during uncomplicated pregnancy because its benefits far outweigh the risks both for the mother-to-be and the foetus [2]. In 2015, the American College of Obstetricians and Gynaecologists (ACOG) established that a moderate-intensity exercise programme lasting 20–30 minutes per day on most or all days of the week is both safe and advantageous for healthy pregnant women [3]. The ACOG Committee Opinion is complementary with the National Institute for Health and Care Excellence Guidelines as well as with the national public health guidelines from seven other countries [4, 5].

Maternal advantages of regular exercise during pregnancy include improved cardiovascular function and reduced incidence of preeclampsia and gestational diabetes mellitus (GDM) [6–10]. Regular aerobic exercise has also been shown to decrease gestational weight gain (GWG) and the risk of obesity after delivery [11]. Excessive GWG and GDM are correlated with an increased probability of delivery of large-for-gestational-age (LGA) neonates and a higher risk of perinatal trauma, neonatal hypoglycaemia and metabolic syndrome in the future [12, 13]. Regular physical activity also has a positive effect on the delivery and postpartum period—exercise is accompanied by shorter labour as well as decreased incidence of operative delivery [14]. No association between moderate physical activity

Corresponding author:

Agnieszka Dobrowolska-Redo
 2nd Department of Obstetrics and Gynaecology,
 Medical University of Warsaw, 2 Karowa St, 00–315 Warsaw, Poland
 e-mail: agnieszka.dobrowolskaredo@gmail.com

Received: 11.02.2020 Accepted: 29.10.2020 Early publication date: 16.04.2021

This article is available in open access under Creative Commons Attribution-Non-Commercial-No Derivatives 4.0 International (CC BY-NC-ND 4.0) license, allowing to download articles and share them with others as long as they credit the authors and the publisher, but without permission to change them in any way or use them commercially.

during pregnancy and a higher incidence of preterm births has been proven [15].

However, for pregnant women, some adjustment to regular exercise programmes should be advised, responding to the physiological changes during all three trimesters. The ACOG has published a list of sports that should not be undertaken during pregnancy — contact sports, scuba diving, and activities with a high risk of abdominal trauma [3].

Objectives

Our objective was to assess women's knowledge concerning chosen aspects of exercise programmes during uncomplicated pregnancy and to identify the most common sources of motivation, discouragement and information regarding the subject.

MATERIAL AND METHODS

The cross-sectional survey study involved a sample of Polish women. The inclusion criterion was admission to a tertiary referral centre between December 2016 and January 2017. The exclusion criterion was age over 50 years. Patients included in the analysis were between 17 and 50 years old. Women were asked to complete an anonymous questionnaire (Suppl.1) before their appointment in the outpatient clinic or during hospitalisation. The questionnaire was accepted by the Bioethics Committee of the Medical University of Warsaw.

The questionnaire was based on the Committee Opinion of the ACOG and included demographic questions, the estimated optimal frequency and duration of exercise during a normal pregnancy, and indicated and contraindicated forms of physical activity. The last section [exclusively for women who were pregnant at least once; $n = 202$ (72.1%)] was meant to assess the sources of information concerning physical activity during pregnancy and who motivated and discouraged them from undertaking exercise.

Quantitative variables are presented as medians and quartiles. Qualitative variables are presented as numbers and percentages. The chi-square test was used for comparisons of qualitative and quantitative parameters. The calculations were conducted with STATISTICA 13.1 (manufactured by Statsoft, Poland). P-values < 0.05 were considered statistically significant.

RESULTS

A total of 622 eligible women were approached to participate in the study. A total of 298 agreed to partake and completed most of the survey's questions (non-response rate 52.1%). Women who declined to partake in the study were older (median age 37 years old) in comparison to the respondents (median age 31 years old), the percentage of pregnant women was also lower among non-respondents

— 29.0% in comparison to 49.7% in the group of women who agreed to partake in the study. In the respondents' group, ten women were older than 50 years old and were not included in the analysis, leaving a total of 288 women. The exact demographic characteristics of the study population are presented in Table 1.

The crucial questions that arise when mothers-to-be are considering initiating or continuing physical activity are safety and possible advantages. Most respondents [$n = 259$ (92.5%)] answered that the benefits of moderate exercise during uncomplicated pregnancy outweigh the possible disadvantages. We also attempted to assess surveyed women's knowledge of the precise medical advantages of exercise programs during pregnancy; 204 (80.0%) and 202 (82.4%) respondents were aware of a reduced risk of GDM and preeclampsia, respectively, associated with the physical activity of mothers-to-be. A total of 202 (75.9%) of the surveyed women answered that moderate physical exercise decreases the probability of operative labour. Thirty-one (11.8%) respondents claimed that moderate exercise is responsible for a higher risk of preterm birth; this theory has not been proven in previous studies.

The number of correct answers concerning the optimal frequency and duration of exercise during pregnancy were only 106 (38.1%) and 167 (59.6%), respectively. Furthermore, according to surveyed women, pelvic floor training should be delayed at least three weeks after delivery.

The study revealed a statistically significant impact of sociodemographic parameters on knowledge about physical activity during pregnancy. The rates of correct answers

Table 1. Demographic characteristics of respondents included in the analysis

Parameter		Overall n = 288
Age [years], median (Q1, Q3)		31 (26.35)
Pregnancy	Pregnant	146 (51.2)
	Non-pregnant	139 (48.8)
History of pregnancy	Yes	202 (72.1)
	No	78 (27.9)
Educational level	Elementary	4 (1.4)
	Vocational	8 (2.8)
	Secondary	62 (22.2)
	Higher	205 (73.5)
Residence	Up to 20 000 inhabitants	52 (18.8)
	20 000–100 000 inhab.	53 (19.2)
	More than 100 000 inhab.	171 (62.0)

Data are presented as number (percentage) unless stated otherwise. Numbers may not add up to totals because of missing data; Q1 — first quartile; Q3 — third quartile

concerning specific aspects of regular physical activity in relation to sociodemographic parameters are presented in Table 2.

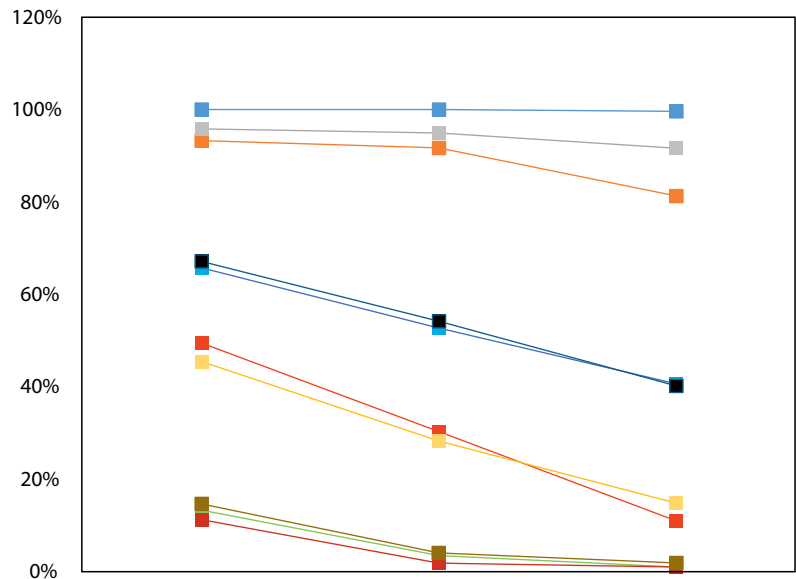
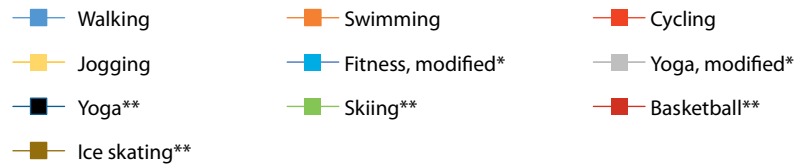
Not all types of exercise recommended by the ACOG were considered safe by most surveyed women, namely, cycling and jogging. There was a tendency of decreasing acceptance of physical activity over the course of the three trimesters of pregnancy (Fig. 1).

Some respondents who had been pregnant at least once most frequently indicated their use of the Internet (81, 50.0%) and maternity books (62, 38.3%) as sources of information concerning physical activity during pregnancy. Medical professionals (doctors and midwives) instructed the surveyed women only in 36 (22.4%) and 31 (18.9%) cases, respectively. Partners, doctors and family members were the main sources of motivation for respondents — in 28 (18.3%),

Table 2. Patients' awareness rate of chosen aspects of regular and moderate physical activity of uncomplicated pregnancy in relation to sociodemographic parameters

Yes		Beneficial role		Optimal frequency (per week)		Optimal duration		Lower risk of GDM		Lower risk of preeclampsia	
		Yes	No	6–7 times	Other	20–30 min	Other	Yes	No	Yes	No
Overall	n %	259 92.5	21 7.5	106 38.1	172 61.9	167 59.6	113 40.4	204 80.0	51 20.0	202 82.4	43 17.6
Maternal age [years]											
≤ 30	n %	129 94.2	8 5.8	42 30.6	95 69.4	89 65.0	48 35.0	101 80.2	25 19.8	107 87.0	16 13.0
> 30	n %	138 91.2	13 8.6	63 45.0	77 55.0	77 54.6	64 45.4	102 80.3	25 19.7	95 78.5	26 21.5
p		0.366		0.014*		0.078		0.975		0.079	
Pregnancy											
Pregnant	n %	173 92.0	15 8.0	57 39.6	87 60.4	78 53.8	67 46.2	105 77.8	30 22.2	108 80.0	27 20.0
Non-pregnant	n %	81 93.1	6 6.9	36 42.4	49 57.6	56 65.1	30 34.9	67 85.9	11 14.1	63 85.1	11 14.9
p		0.753		0.680		0.091		0.148		0.357	
History of pregnancy											
Yes	n %	187 92.6	15 7.4	82 41.0	118 59.0	113 55.9	89 44.1	144 78.2	40 21.8	143 80.8	34 19.2
No	n %	72 92.3	6 7.7	24 30.8	54 69.2	54 69.2	24 30.8	60 84.5	11 15.5	59 86.8	9 13.2
p		0.940		0.115		0.042*		0.264		0.271	
Education level											
Elementary Vocational or Secondary	n %	62 83.8	12 16.2	31 41.9	43 58.1	31 50.8	30 49.2	52 77.6	15 22.4	55 88.7	7 11.3
Higher	n %	196 95.6	9 4.4	75 36.9	128 63.1	131 63.9	74 36.1	152 80.8	36 19.2	147 80.3	36 19.7
p		0.001*		0.454		0.066		0.569		0.134	
Residence											
Up to 20 000 inhabitants	n %	46 88.5	6 11.5	22 43.1	29 56.9	28 53.8	24 46.2	36 78.3	10 21.7	37 84.1	7 15.9
20 000–100 000 inhab.	n %	48 90.6	5 9.4	16 30.8	36 69.2	35 66.0	18 34.0	30 65.2	16 34.8	29 69.0	13 31.0
More than 100 000 inhab.	n %	162 94.7	9 5.3	66 38.6	105 61.4	102 59.6	69 40.4	134 84.3	25 15.7	133 85.2	23 14.8
p		0.246		0.416		0.444		0.018*		0.048*	

Numbers may not add up to totals because of missing data; *statistically significant correlation ($p < 0.05$); GDM — gestational diabetes mellitus



	I trimester	II trimester	III trimester
Walking	100%	100%	99.60%
Swimming	93.26%	91.70%	81.25%
Cycling	49.40%	30.20%	10.83%
Jogging	45.38%	28.14%	14.67%
Fitness, modified*	65.69%	52.63%	40.54%
Yoga, modified*	95.80%	94.90%	91.60%
Yoga**	67.08%	54.11%	40.09%
Skiing**	13.17%	3.30%	0.83%
Basketball**	11.11%	1.67%	0.84%
Ice skating**	14.52%	3.88%	1.72%

Figure 1. Respondents' acceptance rate of voluntary activities during three trimesters of pregnancy; *regular activity needs some modification for pregnant women — some stationary positions may cause compression of vena cava inferior and hypotension; **sports considered unsafe in ACOG Committee Opinion from Dec 2015

22 (14.4%) and 19 (12.4%) cases, respectively. In our study, family members, doctors and acquaintances most often discouraged pregnant women from undertaking physical activity during pregnancy — in 35 (22.3%), 15 (9.6%) and 11 (7.0%) cases, respectively.

DISCUSSION

In our study, we identified the weak points concerning specific aspects of Polish women's knowledge regarding physical activity during pregnancy. These weaknesses may

be easily addressed in a simple, cost-effective way, with potential benefits for both mothers-to-be and their children.

Numerous gynaecologists' and obstetricians' societies, including the ACOG, emphasise that recreational physical activity in uncomplicated pregnancy is a significant component of a healthy lifestyle [2–5]. However, in a study by Evenson et al. [15], involving 1979 pregnant and 657 non-pregnant women, it was shown that the prevalence of any leisure-time physical activity was higher for non-pregnant women [73.1% (95% CI 72.4–73.9) vs 65.6%

(95% CI 62.0–69.1)]; they also engaged in recommended physical activity more often (26.1% vs 15.8%).

While the knowledge of the surveyed women regarding beneficial roles may be considered satisfactory, respondents with higher education proved to be more aware of this fact. The analysis also showed significant differences regarding awareness of the reduced risk of preeclampsia and GDM depending on the place of residence of the surveyed women. In our study, only 106 (38.3%) and 167 (59.6%) respondents chose the recommended optimal frequency and duration of exercise in pregnancy. This may lead to negative consequences. In the subgroup of Danish National Birth Cohort study, which included 85,139 women, it was proven that excessive physical activity for more than 270 minutes weekly in the first trimester was associated with a higher risk of severe subtypes of preeclampsia than in a non-exercising group (OR 1.6, 95% CI 1.1–2.4 vs OR 1.8, 95% CI 1.1–3.0) [16].

Pelvic floor muscle training is recommended by the ACOG directly after delivery, and as shown in the Cochrane Review in 2017, women who undertake intensive pelvic floor exercise were less likely to report urinary incontinence twelve months after delivery (RR 0.60, 95% CI 0.35–1.03) [3, 17]. Therefore, delay in introducing pelvic floor muscle training may be disadvantageous for postnatal women, both for those who leak and those who do not leak urine while pregnant [17]. The effect of pelvic floor exercise may be greater in certain groups, for instance, in women who are at higher risk of urine incontinence, such as primiparous women, those who have bladder neck hypermobility in early pregnancy or those who are anticipating a forceps delivery [17].

Despite generally good knowledge on the safety of specific forms of leisure-time activities in pregnancy, there is still room for improvement. In contrast to ACOG recommendations, the majority of our respondents claimed that stationary cycling and jogging should not be undertaken during uncomplicated pregnancy [3]. Yoga during the first and second trimesters of pregnancy was accepted by more than half of the surveyed women, while Clark et al. [18], proved that some yoga positions may result in decreased venous return and hypotension in 10–20% of pregnant women.

Reliable and up-to-date sources of information and high levels of motivation are essential for continuous physical effort in every stage of life, including pregnancy. In the process of implementing guidelines, it is essential to define and develop reliable and widely available sources of information. In addition to our study, the Internet is an important part of women's information-seeking and decision-making during pregnancy [19, 20]. The question that arises is the reliability of online published data. In a review of Eysenbach et al. [21], 77% of 79 analysed studies concluded that the quality of

information is a problem on the Internet. In a recent study by Cannon et al. [22], among nine identified government and leading industry websites providing information on physical activity during pregnancy, only one website aligned fully with the guidelines. Moreover, 66% of the websites did not report any information on pelvic floor exercises. Thus, reliable online sources based on up-to-date medical knowledge should be considered. The cost-effectiveness of this intervention could also be regarded.

The results of our study indicate that the role of medical professionals providing information concerning physical activity during pregnancy is limited: respondents chose doctors and midwives as sources of information only in 36 (22.4%) and 31 (18.9%) cases, while they motivated the surveyed women in 22 (14.4%) and 9 (5.9%) cases, respectively. In the qualitative analysis of De Vivo et al. [23], midwives emphasised the challenges to the effective promotion of physical activity — increasing demands and expectations of their profession, the burden of responsibility, and a lack of time and proper training. In the same study, midwives suggested how these barriers could be addressed; advised interventions included professional development, team cooperation, effective communication and stronger internal motivation. These issues could be addressed by the health authorities, reinforcing the role of midwives providing more consistent advice regarding physical activity during pregnancy.

The antenatal dietary and intervention of the OPTIMISE randomised trial showed no effect on either excessive gestational weight gain or the proportion of infants with birth weight above 4.0 kg [24]. These findings were consistent with the results of the GeliS trial regarding adiposity gain in pregnancy [25]. Introducing a lifestyle programme into daily work and arranging individualized counselling sessions remain a challenge. Thus, efficient cooperation among all health professionals may increase the adherence of pregnant women to lifestyle advice and improve health outcomes.

According to the study of Connelly et al. [26], a lack of motivation is one of the main modifiable factors in leisure-time physical activity during pregnancy. In the analysis of Findley et al. [27], women with a history of pregnancy reported that family members and partners advised them to stop physical activity during pregnancy and offered them advice, leading them to perceive a lack of ownership over their bodies. In our study, family members discourage the pregnant women from undertaking physical activity most frequently [in 35 (22.3 %) of cases]. Widely accessible programmes dedicated to reaching people who influence pregnant women and educating them on this subject could help them recognise their influence over the decision-making process regarding physical activity during pregnancy and

support women in overcoming their worries concerning exercise during pregnancy.

CONCLUSIONS

The findings indicate that knowledge about physical activity during pregnancy in Polish women is satisfactory. However, awareness concerning the optimal duration and frequency of physical activity in uncomplicated pregnancies could be improved. Medical professionals do not frequently educate and motivate women to undertake physical activity in pregnancy, although it could be beneficial for both mothers-to-be and their children.

Conflict of interest

None declared.

REFERENCES

- WHO: Global recommendations on physical activity for health. Geneva World Heal Organ.; 2010.
- <https://www.who.int/dietphysicalactivity/global-PA-recs-2010.pdf> (2019.11.17).
- Artal R, O'Toole M. Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period. *Br J Sports Med.* 2003; 37(1): 6–12; discussion 12, doi: [10.1136/bjism.37.1.6](https://doi.org/10.1136/bjism.37.1.6), indexed in Pubmed: [12547738](https://pubmed.ncbi.nlm.nih.gov/12547738/).
- Wynne B. American College of Obstetricians and Gynecologists (ACOG). ACOG Committee Opinion No. 650. Physical Activity and Exercise During Pregnancy and the Postpartum Period. *Obs Gynecol. Encyclopedia of Global Health.* 2015; 126: 135–142, doi: [10.4135/9781412963855.n61](https://doi.org/10.4135/9781412963855.n61).
- National Institute for Health and Care Excellence. Weight management before, during and after pregnancy. NICE Guidel. 2010. <https://www.nice.org.uk/guidance/ph27/resources/weight-management-before-during-and-after-pregnancy-1996242046405> (2019.11.17).
- Evenson KR, Barakat R, Brown WJ, et al. Guidelines for Physical Activity during Pregnancy: Comparisons From Around the World. *Am J Lifestyle Med.* 2014; 8(2): 102–121, doi: [10.1177/1559827613498204](https://doi.org/10.1177/1559827613498204), indexed in Pubmed: [25346651](https://pubmed.ncbi.nlm.nih.gov/25346651/).
- Rudra CB, Sorensen TK, Luthy DA, et al. A prospective analysis of recreational physical activity and preeclampsia risk. *Med Sci Sports Exerc.* 2008; 40(9): 1581–1588, doi: [10.1249/MSS.0b013e31817cab1](https://doi.org/10.1249/MSS.0b013e31817cab1), indexed in Pubmed: [18685534](https://pubmed.ncbi.nlm.nih.gov/18685534/).
- Aune D, Saugstad OD, Henriksen T, et al. Physical activity and the risk of preeclampsia: a systematic review and meta-analysis. *Epidemiology.* 2014; 25(3): 331–343, doi: [10.1097/EDE.0000000000000036](https://doi.org/10.1097/EDE.0000000000000036), indexed in Pubmed: [24713878](https://pubmed.ncbi.nlm.nih.gov/24713878/).
- Russo LM, Nobles C, Ertel KA, et al. Physical activity interventions in pregnancy and risk of gestational diabetes mellitus: a systematic review and meta-analysis. *Obstet Gynecol.* 2015; 125(3): 576–582, doi: [10.1097/AOG.0000000000000691](https://doi.org/10.1097/AOG.0000000000000691), indexed in Pubmed: [25730218](https://pubmed.ncbi.nlm.nih.gov/25730218/).
- Tobias DK, Zhang C, van Dam RM, et al. Physical activity before and during pregnancy and risk of gestational diabetes mellitus: a meta-analysis. *Diabetes Care.* 2011; 34(1): 223–229, doi: [10.2337/dc10-1368](https://doi.org/10.2337/dc10-1368), indexed in Pubmed: [20876206](https://pubmed.ncbi.nlm.nih.gov/20876206/).
- Haakstad LAH, Bø K. Effect of regular exercise on prevention of excessive weight gain in pregnancy: a randomised controlled trial. *Eur J Contracept Reprod Health Care.* 2011; 16(2): 116–125, doi: [10.3109/13625187.2011.560307](https://doi.org/10.3109/13625187.2011.560307), indexed in Pubmed: [21417561](https://pubmed.ncbi.nlm.nih.gov/21417561/).
- Oken E, Kleinman K, Belfort M, et al. Associations of Gestational Weight Gain With Short- and Longer-Term Maternal and Child Health Outcomes. *Obstetrical & Gynecological Survey.* 2009; 64(12): 785–787, doi: [10.1097/01.ogx.0000363246.01792.a2](https://doi.org/10.1097/01.ogx.0000363246.01792.a2).
- Shepherd E, Gomersall JC, Tieu J, et al. Exercise for pregnant women for preventing gestational diabetes mellitus. *Cochrane Database Syst Rev.* 2012; 11(7): CD009021, doi: [10.1002/14651858.CD009021.pub2](https://doi.org/10.1002/14651858.CD009021.pub2), indexed in Pubmed: [22786521](https://pubmed.ncbi.nlm.nih.gov/22786521/).
- Domenjoz I, Kayser B, Boulvain M. Effect of physical activity during pregnancy on mode of delivery. *Am J Obstet Gynecol.* 2014; 211(4): 401.e1–401.11, doi: [10.1016/j.ajog.2014.03.030](https://doi.org/10.1016/j.ajog.2014.03.030), indexed in Pubmed: [24631706](https://pubmed.ncbi.nlm.nih.gov/24631706/).
- Evenson KR, Savitz DA, Huston SL. Leisure-time physical activity among pregnant women in the US. *Paediatr Perinat Epidemiol.* 2004; 18(6): 400–407, doi: [10.1111/j.1365-3016.2004.00595.x](https://doi.org/10.1111/j.1365-3016.2004.00595.x), indexed in Pubmed: [15535815](https://pubmed.ncbi.nlm.nih.gov/15535815/).
- Østerdal ML, Strøm M, Klemmensen AK, et al. Does leisure time physical activity in early pregnancy protect against pre-eclampsia? Prospective cohort in Danish women. *BJOG.* 2009; 116(1): 98–107, doi: [10.1111/j.1471-0528.2008.02001.x](https://doi.org/10.1111/j.1471-0528.2008.02001.x), indexed in Pubmed: [19055653](https://pubmed.ncbi.nlm.nih.gov/19055653/).
- Woodley SJ, Lawrenson P, Boyle R, et al. Pelvic floor muscle training for prevention and treatment of urinary and faecal incontinence in antenatal and postnatal women. *Cochrane Database Syst Rev.* 2017; 12: CD007471, doi: [10.1002/14651858.CD007471.pub3](https://doi.org/10.1002/14651858.CD007471.pub3), indexed in Pubmed: [29271473](https://pubmed.ncbi.nlm.nih.gov/29271473/).
- Clark SL, Cotton DB, Pivarnik JM, et al. Position change and central hemodynamic profile during normal third-trimester pregnancy and post partum. *Am J Obstet Gynecol.* 1991; 164(3): 883–887, doi: [10.1016/s0002-9378\(11\)90534-1](https://doi.org/10.1016/s0002-9378(11)90534-1), indexed in Pubmed: [2003555](https://pubmed.ncbi.nlm.nih.gov/2003555/).
- Lagan BM, Sinclair M, Kernohan WG. Internet use in pregnancy informs women's decision making: a web-based survey. *Birth.* 2010; 37(2): 106–115, doi: [10.1111/j.1523-536X.2010.00390.x](https://doi.org/10.1111/j.1523-536X.2010.00390.x), indexed in Pubmed: [20557533](https://pubmed.ncbi.nlm.nih.gov/20557533/).
- Sayakhot P, Carolan-Olah M. Internet use by pregnant women seeking pregnancy-related information: a systematic review. *BMC Pregnancy Childbirth.* 2016; 16: 65, doi: [10.1186/s12884-016-0856-5](https://doi.org/10.1186/s12884-016-0856-5), indexed in Pubmed: [27021727](https://pubmed.ncbi.nlm.nih.gov/27021727/).
- Eysenbach G, Powell J, Kuss O, et al. Empirical studies assessing the quality of health information for consumers on the world wide web: a systematic review. *JAMA.* 2002; 287(20): 2691–2700, doi: [10.1001/jama.287.20.2691](https://doi.org/10.1001/jama.287.20.2691), indexed in Pubmed: [12020305](https://pubmed.ncbi.nlm.nih.gov/12020305/).
- Cannon S, Lastella M, Vincze L, et al. A review of pregnancy information on nutrition, physical activity and sleep websites. *Women Birth.* 2020; 33(1): 35–40, doi: [10.1016/j.wombi.2018.12.007](https://doi.org/10.1016/j.wombi.2018.12.007), indexed in Pubmed: [30905558](https://pubmed.ncbi.nlm.nih.gov/30905558/).
- De Vivo M, Mills H. „They turn to you first for everything”: insights into midwives' perspectives of providing physical activity advice and guidance to pregnant women. *BMC Pregnancy Childbirth.* 2019; 19(1): 462, doi: [10.1186/s12884-019-2607-x](https://doi.org/10.1186/s12884-019-2607-x), indexed in Pubmed: [31795961](https://pubmed.ncbi.nlm.nih.gov/31795961/).
- Dodd JM, Deussen AR, Louise J. A Randomised Trial to Optimise Gestational Weight Gain and Improve Maternal and Infant Health Outcomes through Antenatal Dietary, Lifestyle and Exercise Advice: The OPTIMISE Randomised Trial. *Nutrients.* 2019; 11(12), doi: [10.3390/nu11122911](https://doi.org/10.3390/nu11122911), indexed in Pubmed: [31810217](https://pubmed.ncbi.nlm.nih.gov/31810217/).
- Kunath J, Günther J, Rauh K, et al. Effects of a lifestyle intervention during pregnancy to prevent excessive gestational weight gain in routine care - the cluster-randomised GeliS trial. *BMC Med.* 2019; 17(1): 5, doi: [10.1186/s12916-018-1235-z](https://doi.org/10.1186/s12916-018-1235-z), indexed in Pubmed: [30636636](https://pubmed.ncbi.nlm.nih.gov/30636636/).
- Connelly M, Brown H, van der Pligt P, et al. Modifiable barriers to leisure-time physical activity during pregnancy: a qualitative study investigating first time mother's views and experiences. *BMC Pregnancy Childbirth.* 2015; 15: 100, doi: [10.1186/s12884-015-0529-9](https://doi.org/10.1186/s12884-015-0529-9), indexed in Pubmed: [25896111](https://pubmed.ncbi.nlm.nih.gov/25896111/).
- Findley A, Smith DM, Hesketh K, et al. Exploring women's experiences and decision making about physical activity during pregnancy and following birth: a qualitative study. *BMC Pregnancy Childbirth.* 2020; 20(1): 54, doi: [10.1186/s12884-019-2707-7](https://doi.org/10.1186/s12884-019-2707-7), indexed in Pubmed: [32000706](https://pubmed.ncbi.nlm.nih.gov/32000706/).

Supplement 1. Physical activity in pregnancy — questionnaire

Physical activity in pregnancy — questionnaire

1. How old are you?
2. Place of residence:
 - countryside or a city < 20,000 inhabitants
 - a city of 20,000 - 100,000 inhabitants
 - a city of > 100,000 inhabitants
3. Education:
 - elementary
 - vocational
 - secondary
 - higher
4. Have you ever been pregnant?
 - Yes
 - No

If you answered "Yes" to question number 4 – How many times have you been pregnant (not including current pregnancy)?
5. Are you pregnant now?
 - Yes
 - No

If you answered "Yes" to question number 5 in which week of pregnancy you are
6. Do you think that the benefits of moderate physical activity in uncomplicated pregnancy are greater than potential risks?
 - Yes
 - No
 - I do not have an opinion
7. What is the optimal frequency of exercise in uncomplicated pregnancy?
 - once a week
 - 2–3 times per a week
 - 4–5 times per a week
 - 6–7 times per a week
 - 8 times or more
8. What is the optimal duration of exercise in uncomplicated pregnancy?
 - up to 10 min
 - 20–30 min
 - 40–60 min
 - more than an hour
9. Do you think that one should reduce both the intensity and the duration of exercise in the course of uncomplicated pregnancy?
 - Yes
 - No, one should increase both the intensity and the duration of exercise
 - No, it should be maintained at the same level
 - I do not have an opinion
10. Which of the following activities can be considered safe in uncomplicated pregnancy? – mark each activity as safe OR unsafe in each of three trimesters.

Activity	I trimester		II trimester		III trimester	
	Safe	Unsafe	Safe	Unsafe	Safe	Unsafe
Walking						
Swimming						
Cycling						
Jogging						
Fitness, modified for pregnant women						
Yoga, modified for pregnant women						
Yoga						
Skiing						
Basketball						
Ice skating						

11. Do you think that moderate physical activity in uncomplicated pregnancy reduces the risk of preeclampsia?
- Yes
 No
12. Do you think that moderate physical activity in uncomplicated pregnancy reduces the risk of gestational diabetes mellitus?
- Yes
 No
13. Do you think that moderate physical activity in uncomplicated pregnancy leads to increased probability of vaginal labour?
- Yes
 No
14. Do you think that moderate physical activity in uncomplicated pregnancy leads to increased probability of preterm delivery (before 37th week of pregnancy)?
- Yes
 No
15. Do you think that pelvic floor training should be delayed after delivery? If yes, how many weeks after delivery?
- Yes, weeks
 No
16. If you answered "Yes" to question number 4: from whom/from which source did you get information concerning physical activity in pregnancy?
- doctor
 midwife
 family members
 friends
 the Internet
 books
 written press
17. If you answered "Yes" to question number 4: who motivated you to undertake physical activity in pregnancy?
- doctor
 midwife
 partner
 family members
 friends
18. If you answered "Yes" to question number 4: who discouraged you from undertaking physical activity in pregnancy?
- doctor
 midwife
 partner
 family members
 friends