Review Paper:

The Perceived Barriers to Physical Activity in Pregnant Women: A Review Study

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Citation: Ahmadi, K. & Amiri-Farahani, L. 2021. The Perceived Barriers to Physical Activity in Pregnant Women: A Review Study. *Journal of Client-Centered Nursing Care*, 7(4), pp. 245-254. https://doi.org/10.32598/JCCNC.7.3.253.2

https://doi.org/10.32598/JCCNC.7.4.253.2

Article info:
Received: 05 Aug 2021
Accepted: 14 Sep 2021
Published: 01 Nov 2021

Keywords:
Pregnancy, Pregnant women, Physical activity, Exercise, Barriers

ABSTRACT

Background: Despite all the positive effects of physical activity on maternal and fetal health, its level is low among pregnant women. Various barriers seem to prevent physical activity during pregnancy. The aim of this study was to investigate and determine the barriers to physical activity during pregnancy based on a review of available literature.

Methods: To review the available literature, the authors searched Persian databases, such as Iran Medex, Magiran, MedLib, and SID, and also English databases, including Scopus, PubMed, Elsevier, ScienceDirect, Web of Science, and ProQuest using the keywords of pregnant woman, physical activity, exercise, barriers, pregnancy, constraints, and attitudes individually or in combination between 2000 and 2020 and finally, 10 articles that met the inclusion criteria were reviewed. An ecological model was used to classify the reported barriers.

Results: Seven quantitative articles and three qualitative articles were included in the study. Obstacles related to the intrapersonal level of the ecological model were the most reported in these studies and were classified into five areas, including pregnancy symptoms and limitations, time constraints, misunderstanding the adequacy of daily activities, lack of motivation, and maternal and fetus safety concerns. Barriers at the interpersonal level included lack of consultation and information and lack of social support and at the environmental, organizational, and political levels, climate and lack of resources were the most reported barriers.

Conclusion: The present study outlined the perceived barriers to physical activity among pregnant women and highlighted the important factors that should be considered when planning interventions to increase the level of physical activity during pregnancy. Further studies are recommended to provide solutions to overcome these barriers and increase the activity of pregnant women.

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Highlights

- Despite all the positive effects of physical activity on maternal and fetal health, its level is low among pregnant women.
- Various barriers seem to prevent physical activity during pregnancy.
- Obstacles related to the intrapersonal level were the most reported in the reviewed studies.
- Symptoms and limitations of pregnancy were the most reported barriers in some studies.
- Concerns about maternal and fetal safety, lack of counseling and information, and lack of social support were prominent barriers to pregnancy that need to be addressed in future studies.

Plain Language Summary

This review study was conducted to identify the perceived barriers to physical activity in pregnant women among the literature that was published between 2000 and 2020. Obstacles related to the intrapersonal level of the ecological model were the most reported in these studies and were classified into five areas, including pregnancy symptoms and limitations, time constraints, misunderstanding the adequacy of daily activities, lack of motivation, and maternal and fetus safety concerns. Barriers at the interpersonal level included lack of consultation and information and lack of social support, and at the environmental, organizational, and political levels, climate and lack of resources were the most reported barriers.

1. Introduction

Pregnancy is a life-changing event that can amend a person's physical activity (Borodulin et al. 2016). Despite the known benefits of physical activity, many pregnant women do not have regular activity (Gaston & Vamos 2013). The US Department of Health and Human Services (2008) recommends regular aerobic and power exercises during pregnancy to all pregnant women who are not prohibited from engaging in physical activity.

According to a study in the US, 31% of pregnant women reported mild physical activity, 38% reported moderate physical activity, and 32% reported intense physical activity (Marshall, Bland, & Melton 2013). The results of a study in Isfahan, Iran, showed that 98.7% of pregnant women had mild physical activity during pregnancy and 1.3% had moderate physical activity (Bahadoran & Mohamadirizi 2015).

Increasing evidence confirms that physical activity during pregnancy reduces gestational diabetes, preterm delivery, weight gain, and risk of preeclampsia (Gaston & Vamos 2013). It also reduces fat mass and improves pain tolerance, mental health (Davis & Dimidjian 2012), and sleep during pregnancy (Borodulin et al. 2010), and reduces postpartum depression (Summerbell et al. 2009). Exercise during pregnancy increases the possibility of vaginal delivery and especially, exercise during the second and third trimesters reduces the risk of cesarean section. Therefore, it is necessary for pregnant women to gradually increase their level of physical activity during pregnancy (Domenjoz, Kayser & Boulvain 2014).

The results of a study showed that the physical activity of pregnant women decreases in the third trimester (Bahadoran & Mohamadirizi 2015). The highest level of physical activity in pregnant women is related to mild activity and the lowest level is related to intense activity (Antosiak-Cyrak & Demuth 2019; Nascimento et al. 2015; Wojtyla et al. 2012).

Numerous barriers to physical activity during pregnancy have been reported in various studies. Individual barriers to physical activity include extreme fatigue, lack of time for exercise, and physical limitations, such as joint pain, pelvic pain, edema, back pain, physical discomfort (Cramp & Bray 2009), and fear of harming the unborn. Among the interpersonal barriers are negative reactions of others to exercise (Irehovbude et al. 2018) and lack of awareness about the benefits or fear of harming the unborn in pregnancy (Evenson et al. 2009). Also,

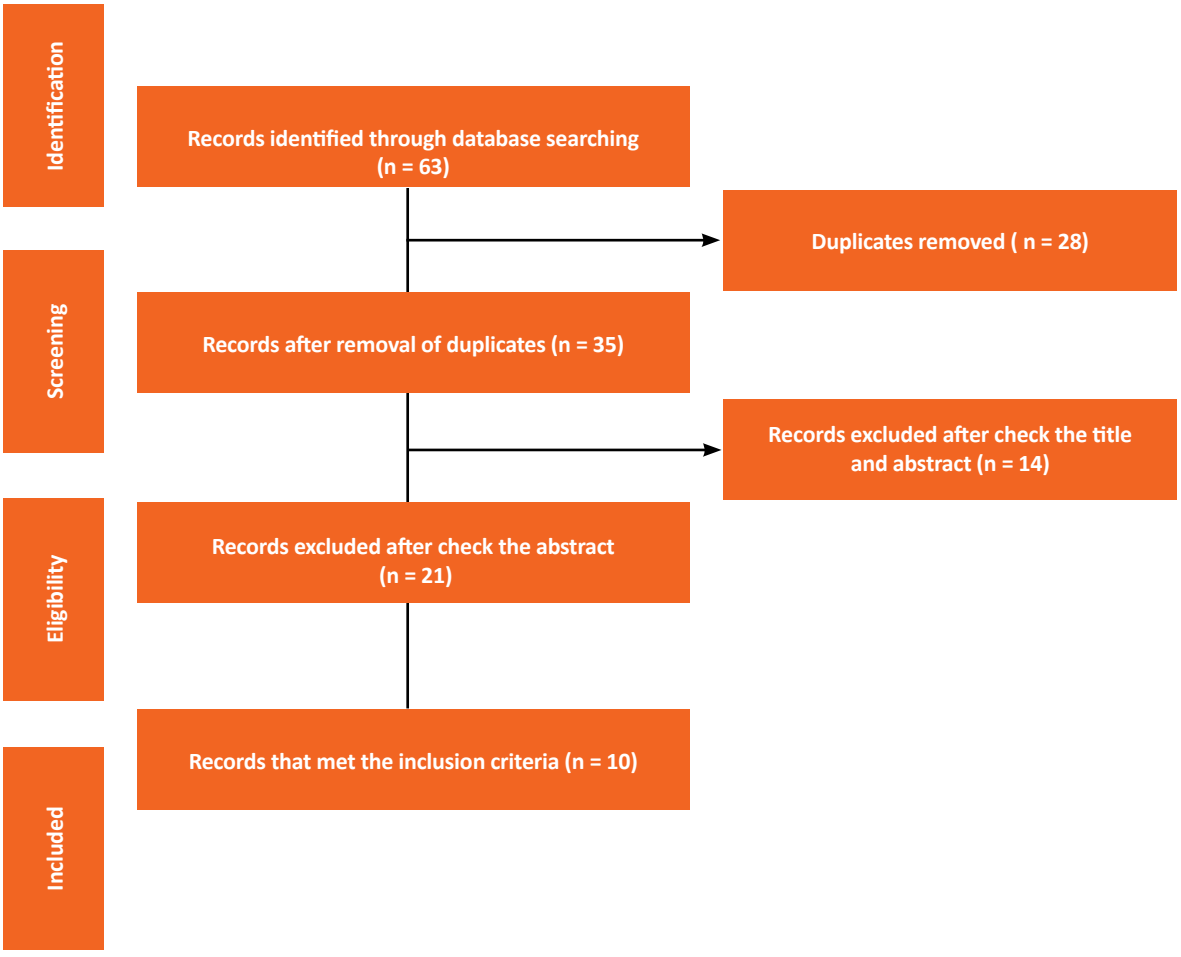

Figure 1. The PRISMA flowchart of literature search

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among the environmental, organizational, and political barriers, living far away from the exercise venues and the high cost of exercise classes have been mentioned (Irehovbude et al. 2018).

In some studies, no significant relationship was found between demographic characteristics, such as age, number of children, gestational age, education, and income level, and the level of physical activity (Bahadoran & Mohamadirizi 2015). It has also been reported that the likelihood of exercising during pregnancy is not associated with ethnicity and Body Mass Index (BMI) before pregnancy or early pregnancy, while college education significantly increases the chances of exercising during pregnancy (Nascimento et al. 2015). Being white, having no children, and having a history of exercise before pregnancy have been associated with more physical activity during pregnancy (Gaston & Vamos 2013). In a study, pregnant women with younger age and lower family support obtained higher scores of barriers to physical activity (Da Costa & Ireland 2013).

Before taking any action, the barriers that reduce the physical activity of pregnant women should be determined. The aim of this study was to investigate and determine the barriers to physical activity during pregnancy based on a review of available literature.

2. Materials and Methods

This review study used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach to select appropriate resources. Accordingly, a search was conducted in reputable Persian language databases, including Iran Database (Magiran), Scientific Information Database of Jahad Daneshgahi (SID), and Iranian Medical Sciences Databases (IranMedex and MedLib), as well as English language databases, including Scopus, PubMed, Elsevier, Ovid, ScienceDirect, Web of Science, and ProQuest using a combination of keywords, including pregnant woman, physical activity, exercise, barriers, pregnancy, constraints, attitudes, and their Persian equivalents in the title or abstract of the studies. The search was limited to human studies re-

garding barriers to physical activity in pregnant women published between 2000 and 2020 in Persian or English language that access to their full text was provided. Articles with the blurred method and duplicate articles were excluded. From a total of 63 articles, after removing the duplicates, 10 articles that met the inclusion criteria were selected and reviewed (Figure 1).

Seven quantitative articles and three qualitative articles were included in the study. Among the quantitative articles, one was a randomized clinical trial, three were descriptive studies, and three were prospective studies. It should be noted that no study was found on pregnant women's perceived barriers to physical activity in Iran.

3. Results

The results of this review study showed that the studies had used structured and semi-structured questionnaires, researcher-made questionnaires, and face-to-face interviews to collect data. Table 1 provides detailed information on the seven quantitative studies and three qualitative studies that were included in this review study.

The results showed that pregnant women perceived many barriers to physical activity. In two quantitative studies, lack of family support was associated with greater perceived barriers (Da Costa & Ireland 2013; Irehovbude et al. 2018). Results of two other quantitative studies by Santos et al. (2014) and Irehovbude et al. (2018) showed that lack of time, high workload, aversion to exercise, living far away from exercise venues, fear of harming the unborn, and lack of sports centers were among individual perceived barriers. In the first and second trimesters, 13.3% and 10.2% of the participants had rarely referred to the neighborhood or environmental factors and interpersonal barriers, respectively; thus, the authors of these studies concluded that the perceived barriers were similar in both trimesters (Irehovbude et al. 2018; Santos et al. 2014). In another study, lack of time for exercise and experience of physical limitations accounted for 64% of barriers to physical exercise (Connelly et al. 2015). In a study, 84.4% of the barriers were related to individual factors, 2.2% to interpersonal factors, 3.1% to environmental factors, 0.5% to organizational factors, and 1.3% to political factors, and in 8.2% of cases, no reason was mentioned as an obstacle to activity (Evenson et al. 2009). Another study had classified the barriers to physical activity in 42 items and 7 main categories, including 1) pregnancy symptoms, 2) responsibilities and activities of family and children, 3) lack of personal motivation, 4) time and job requirements, 5) adequacy of daily activities and no need for exercise, 6) fear of injury or harm, and 7) lack of the previous history of physical activity (Marshall, Bland & Melton 2013). In two studies, the environmental, organizational, and political barriers were more prominent (Kieffer et al. 2002; Cioffi et al. 2010). In the study by Leppanen et al. the interpersonal, environmental, organizational, and political barriers had been specifically perceived by pregnant women (Leppänen et al. 2014). The summary of extracted barriers from studies based on the ecological model is listed in Table 2.

4. Discussion

The present study summarized the perceived barriers to physical activity among pregnant women in quantitative and qualitative studies in this field. Despite wide differences in study design, sample size, and participant characteristics, there were slight differences between the barriers. Intrapersonal barriers had been mentioned in the studies more than other barriers. Among the barriers, pregnancy-related symptoms, such as fatigue, nausea, physical pain, and bodily changes had been frequently reported as barriers to women's physical activity during pregnancy. Symptoms, such as nausea, fatigue, and sleep problems were the most important barriers to physical activity in the first trimester of pregnancy, while physical limitations caused by fetus development, such as shortness of breath and back/pelvic pain were often experienced in the last trimester of pregnancy.

Women consistently had reported "fear of harming the unborn baby" by physical activity, a perception that was evident even among pregnant women who were previously active and continued to lead an active lifestyle during pregnancy (Hegaard et al. 2011). "Time constraints" due to job commitments and lack of motivation had also been frequently mentioned as intrapersonal barriers (Kieffer et al. 2002; Marshall, Bland & Melton 2013).

Among the barriers classified as intrapersonal barriers, some women had cited the notion of "being active enough in daily activities, "such as housework, especially in pregnant women who had lived in a rural community (Marshall, Bland & Melton 2013). "Lack of prenatal exercise programs" was classified in the category of lack of motivation, which seems to be an important barrier to designing and implementing effective interventions. In a review of literature of the studies conducted on women who had been active before pregnancy, the results showed that although they had reported similar barriers to physical activity, they tended to maintain a pre-pregnancy exercise routine during pregnancy (Santos et al. 2014; Gaston & Vamos 2013). Physical activity before pregnancy is one of the strongest predictors of maintain-

Table 1. Characteristics of the studies that evaluated the barriers to physical activity in pregnant women

No.	Authors	Aim of Study	Type of Study	Samples and Tools/Data Generation Methods	Results
1	Da Costa & Ireland (2013)	Comparing perceived benefits and barriers to leisure-time physical activity (LTPA) during pregnancy among women who were insufficiently active or inactive before pregnancy	Cross-sectional study	82 healthy pregnant women attending the offices of gynecologists who met the inclusion criteria Exercise Benefits/Obstacles Scale (EBBS), Social Support for Exercise (SSE), Epworth Postnatal Depression Scale (EPDS), Multidimensional Fatigue Inventory (MFI)	Women in the inactive group reported higher barrier scores than women who were active before pregnancy (P=0.022). The energy intensity, physical activity (PA), leisure time, exercise self-efficacy, and family support for exercise were significantly higher in women who were active before pregnancy compared to inactive women. Younger active women perceived more barriers.
2	Santos et al. (2014)	Analysis of PA engagement during the first and second trimesters of pregnancy, with reference to the different PA guidelines	Prospective study	133 pregnant women with a gestational age of 10-12 weeks. A researcher-made and self-report questionnaire that consisted of six sections: demographic characteristics, lifestyle variables, health status during pregnancy, history of cosmetic surgery, measurement of anthropometric indices, and measurement of PA level with accelerometer	Reduced PA levels from the first trimester to the second trimester for all recommendations. The most commonly reported barriers to PA at leisure time during pregnancy were individual and unrelated barriers to health, including lack of time, high workload, and aversion to exercise. In the first and second trimesters, 13.3% and 10.2% of the participants mentioned neighborhood or environmental factors as barriers to PA at leisure time during pregnancy, respectively. Interpersonal barriers were rarely mentioned in the first and second trimesters. This study concluded that the perceived barriers were similar in both quarters.
3	Cramp & Bray (2009)	To examine barriers to LTPA and investigate barrier and exercise self-efficacy as predictors of self-reported LTPA during pregnancy	Prospective study	161 pregnant women at 18, 24, 30, and 36 weeks of pregnancy were examined The Questionnaires of Barriers to PA, Exercise Self-Efficacy, and Modifiable Activity for Measuring PA at Leisure Time	Excessive fatigue, lack of time to exercise, and experiencing physical limitations (64%), high workload (15%), weather (13.3%), lack of motivation (2.5%), lack of support 3.3%, and prohibition of PA (0.8%) accounted for all barriers.
4	Evenson et al. (2009)	To examine barriers to PA in a large cohort of pregnant women	Cohort study	1535 pregnant women with a gestational age of 20-37 weeks By phone: Demographic questions and the answer to the question "What factors prevent you from PA during pregnancy at work and leisure time?"	84.4% of barriers were related to individual factors, of which 52.1% were related to health and 32.7% were unrelated to health, 2.2% were interpersonal barriers, 3.1% were environmental factors, 0.5% were organizational factors, 1.3% were political factors, and 8.2% were with no reason.
5	Irehovbude et al. (2018)	To ascertain the benefits and barriers to antenatal exercise perceived by pregnant women	Descriptive research	175 pregnant women The three-part questionnaire, which included section A: demographic information, section B: acceptable information about daily exercise in pregnant women, and section C: the benefits/barriers to exercise questionnaire	The most perceived barriers included being far away from sports venues, my husband and other important people do not encourage me to exercise, harm to the unborn child, and very few places to exercise. The moderate perceived barriers included high cost, being embarrassed by exercise, exercise takes a lot of time of family communication, and the schedule of using sports facilities is not consistent with mine, negative reactions of relatives to exercise. The least perceived barriers to exercise included high workload, I am tired of exercising, and exercising is boring.
6	Marshall, Bland & Melton (2013)	To describe perceived barriers to PA among pregnant women living in a rural community	Descriptive research	88 healthy pregnant women living in rural areas referring to routine care clinics The used tool consisted of two parts; the first part was the demographic questionnaire, and the second part was the international PA questionnaire, plus an open-ended question: "What keeps you from exercising during pregnancy?"	The results of the study were summarized in 42 items and 7 main categories. These categories included 1) pregnancy symptoms, 2) responsibilities and activities of the family and children, 3) lack of personal motivation, 4) time and job requirements, 5) adequacy of daily activities and no need for exercise, 6) fear of injury or harm, and 7) lack of the previous history of PA.

No.	Authors	Aim of Study	Type of Study	Samples and Tools/Data Generation Methods	Results
7	Connelly et al. (2015)	To identify modifiable barriers to LTPA among women who did not meet PA guidelines during pregnancy	Qualitative study	133 mothers with different levels of socio-economic status attending the Maternal and Child Health Center A demographic questionnaire and an open-ended questionnaire about PA: "Do you do PA at your spare time during pregnancy that makes it difficult for you to breathe"?	According to the results of the study, the data were classified into three categories of individual, interpersonal, and environmental factors. Qualitative data were extracted and all were related to individual factors, including 1) work-related barriers, 2) fatigue, 3) pregnancy-related barriers, 4) activity below the recommended level, 5) lack of motivation, and 6) lack of awareness about the recommended level of PA in pregnancy.
8	Leppanen et al. (2014)	To examine the predictors of change in intensity-specific LTPA during pregnancy	Randomized controlled trial	399 pregnant women at risk for gestational diabetes Self-report questionnaire on barriers to PA in the second trimester of pregnancy	Obstacles included lack of social support (such as lack of companionship when exercising, others' advice to avoid exercising, lack of encouragement of family and friends to exercise, the attitude of spouse and family regarding lack of PA during pregnancy, lack of social norms that is based on encouraging PA), unfavorable weather (very hot, very cold, and bad weather) and lack of resources (unsafe environment, lack of vehicle, high cost, and lack of special program for pregnant mothers).
9	Kieffer et al. (2002)	To engage pregnant and postpartum Latino women in the discussion of (1) their perceptions of diabetes risk and impact, (2) their physical activity-related beliefs, attitudes, and practices, and (3) factors influencing their participation in regular PA during and after pregnancy	Qualitative study	Thirteen Latin American pregnant women were examined The focused group in the next stage of the third quarter (30-36 weeks)	Environmental, organizational, and political barriers, including adverse weather conditions (very hot, very cold, and bad weather) and lack of resources (unsafe environment, lack of vehicles, high costs, and lack of special programs for pregnant mothers), and lack of amenities.
10	Cioffi et al. (2010)	To describe women's perceptions and participation in PA during pregnancy and identify factors influencing participation	Qualitative study	19 pregnant women were examined at different stages of pregnancy from two public health clinics Focus group and face-to-face interviews at any gestational age	Lack of resources (unsafe environment, lack of vehicle, high cost, lack of special program for pregnant mothers), and lack of amenities.

LTPA: Leisure-Time Physical Activity; PA: Physical Activity.

Table 2. The summary of extracted physical activity barriers based on the ecological model

Category	Barriers
Intrapersonal	1. Fatigue; 2. Tiredness; 3. Lack of energy; 4. Feeling unwell or uncomfortable; 5. Nausea; 6. Back and pelvic pain; 7. Swelling; 8. Soreness; 9. Shortness of breath; 10. Leg cramps; 11. Morning sickness; 12. Contractions; 13. Headache; 14. Anemia; 15. Diseases; 16. Bodily changes; 17. The growing body; 18. Physical limitations; 19. No time; 20. Being too busy duo to work; 21. Childcare and family responsibilities; 22. Daily life activities provide sufficient exercise; 23. Lower self-efficacy or discipline; 24. Pregnancy is a time to rest; 25. Dislike of exercise; 26. No habit of exercising; 27. No pre-pregnancy physical activity routine; 28. Problems with body image; 29. Embarrassment about appearance; 30. Fear of harming the baby or self; 31. Concern with pregnancy complications, such as miscarriages and premature labor, 32. Lack of personal motivation, 33. Adequacy of daily activities and no need for exercise, 34. Lack of a previous history of physical activity
Interpersonal	1. Lack of knowledge about how to exercise safely during pregnancy; 2. Lack of health care provider guidance or counseling; 3. Lack of access to consistent information; 4. Lack of advice and support on the benefits of physical activity during pregnancy; 5. Insufficient and contradictory information; 6. Lack of accessible information; 7. Having no partner to exercise with; 8. Advice to avoid exercise; 9. No support from family and friends; 10. Conflicting advice from others; 11. Sense of exclusion at the fitness center; 12. Lack of social norms that encourage physical activity
Environmental, organizational, and political	1. Lack of resources; 2. Unsafe neighborhood; 3. Lack of transportation; 4. Lack of recreational facilities; 5. Too costly; 6. Lack of specific programs for pregnant women; 7. Cold weather; 8. Hot weather.

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ing physical activity during pregnancy (Hegaard, et al. 2011; Da Costa & Ireland, 2013; Leppänen et al. 2014).

Among the interpersonal barriers, "lack of counseling and information" and "lack of social support" were among the barriers to physical activity during pregnancy. Regarding the lack of counseling and information, studies had pointed to the lack of knowledge on how to exercise safely during pregnancy, and lack of guidance from health care providers on the benefits of physical activity during pregnancy (Krans et al. 2005). Considering the lack of social support, the attitude of relatives in acknowledging the lack of physical activity during pregnancy was a known obstacle. In this regard, a recent study showed that women's relatives and friends influence them by telling anxious and negative stories about sports habits during pregnancy (Reichert et al. 2007).

Environmental, organizational, and political barriers are often described in studies on pregnant women with low-income and ethnic minorities (Marshall, Bland, and Melton, 2013). External factors, such as "unfavorable weather", "limited access to sports facilities", "concern about the cost of physical activity" , and "lack of specific physical activity programs for pregnant women" scored lower in some studies (Irehovbude et al. 2018; Leppänen et al. 2014; Cioffi et al. 2010). To increase the number of safe and low-cost physical activity facilities, the investors should be considered by policymakers because they can create an environment that promotes active behavior in pregnant women. Providing group physical activity classes for pregnant women at health centers and prenatal clinics can also be an option to encourage regular physical activity and introduce women to a new social support network. In addition, low-cost activities, such as walking should also be promoted because it does not require special equipment, requires little skill, and does not need to be designed specifically for pregnant women.

5. Conclusion

The present study outlined the perceived barriers to physical activity among pregnant women in various contexts and highlighted the important factors that should be considered when planning interventions to increase the level of physical activity during pregnancy.

Although many barriers to physical activity among pregnant women are similar to those reported in the general population, significant barriers to pregnancy were also identified in this study. Symptoms and limitations of pregnancy, regardless of the study design, have often been mentioned in various texts as barriers to physical activity during pregnancy. On the other hand, concern about the safety of mother and child, lack of counseling, and lack of social support are some barriers to physical activity in pregnancy, which have been reported more among qualitative studies.

Based on the findings of this review study, it is recommended that future researchers focus on the views of health care professionals about physical activity during

pregnancy because the current studies lack the information on how physicians overcome possible barriers and how they advise pregnant women to engage in physical activity. In addition, future interventional studies on the barriers to physical activity during pregnancy would affect the level of physical activity during pregnancy.

Ethical Considerations

Compliance with ethical guidelines

Ethical issues related to authorship were considered. Duplicate publications were avoided. In case of suspected plagiarism or fraudulent research, the article was excluded. The authors tried to write with a level of inclusion, respect, and acknowledgement of diversity. Also bias and exclusive language (sexist, racist, homophobic, etc.) were avoided.

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Authors' contributions

Both authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interests.

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