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Contemplation to Maintenance: Facilitating Physical Activity among Pregnant Women

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ABSTRACT

Background: Physical activity during pregnancy is vital for maternal health and positive outcomes for both mother and baby. Despite its benefits, many pregnant women find it challenging to exercise regularly. The Stages of Change Model offers a framework to understand and facilitate this behaviour change. **Objective:** This study aimed to explore the stages of change in physical activity behaviours among pregnant women in Mosul, identifying barriers and facilitators specific to this context to inform tailored interventions. **Methods:** A mixed-methods approach was employed, involving 300 pregnant women from antenatal clinics in Mosul. Participants completed a questionnaire assessing their physical activity levels, stage of change, and related factors. Focus group discussions and in-depth interviews with healthcare providers provided qualitative insights. Quantitative data were analyzed using descriptive statistics, chi-square tests, ANOVA, and logistic regression. Qualitative data underwent thematic analysis. **Results:** Most participants were in the contemplation (30%) and preparation (25%) stages, showing awareness of physical activity benefits but inconsistent engagement. Barriers included lack of time (45%), fatigue (40%), and unsafe exercise environments (35%). Facilitators were support from healthcare providers (50%), prenatal exercise programs (30%), and social support (25%). Progression through the stages was predicted by higher education (OR = 2.1, 95% CI = 1.3-3.4), lower BMI (OR = 0.8, 95% CI = 0.6-0.9), strong social support (OR = 2.5, 95% CI = 1.5-4.1), and a positive attitude towards physical activity (OR = 3.0, 95% CI = 1.8-5.0). Over 50% of participants reported regular activity, indicating improved adherence to exercise guidelines. **Conclusion:** The study reveals varying physical activity levels among pregnant women in Mosul and the influencing factors at different stages of change. Tailored interventions addressing specific barriers and leveraging facilitators can effectively promote physical activity during pregnancy. The Stages of Change Model provides a structured approach to support pregnant women in adopting and maintaining physical activity.

Keywords: Barriers; Facilitators; Mosul; Physical Activity; Maternal Health; Pregnancy; Stages of Change Model; Tailored Interventions

INTRODUCTION

The nursing profession is exceptionally demanding and requires great dedication and hard work (Sulaiman *et al.*, 2023). Physical activity during pregnancy is crucial for maintaining maternal health and promoting positive outcomes for both mother and baby (Kasahun *et al*., 2023; Sun *et al.*, 2023). Despite its known benefits, many pregnant women struggle to incorporate regular exercise into their daily routines (Gonçalves *et al*., 2024; Shang *et al*., 2023). Understanding the psychological and behavioural processes involved in adopting and maintaining physical activity can provide valuable insights for designing effective interventions (Laudanska-Krzeminska & Krzysztoszek, 2024; Liu, Huang & Wen, 2024). The Stages of Change Model offers a structured framework to explore these processes and guide pregnant women through becoming and staying active (Ding *et al.,* 2023; Hayudanti *et al*., 2022).

Regular physical activity during pregnancy has been shown to reduce the risk of gestational diabetes,

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hypertension, and excessive weight gain while improving mood, energy levels, and overall well-being (Do *et al.,* 2023; Kean *et al*., 2023). In Mosul, where cultural, social, and economic factors may pose additional barriers to exercise, it is essential to identify strategies to support pregnant women in adopting healthier lifestyles. By applying the Stages of Change Model, this study aims to develop tailored interventions that address the unique needs and challenges expectant mothers face in this region. Previous research (Chatzakis *et al.*, 2023; Negash & Alelgn, 2023; Zolnikov, Rodrigues-Denize & Furio, 2024; Ruart *et al*., 2023; Wilczynska *et al.*, 2024; Yang *et al*., 2023; Zhou *et al*., 2023) on physical activity during pregnancy has primarily focused on populations in Western countries, with limited attention given to the specific experiences and barriers faced by pregnant women in Mosul. This gap in the literature highlights the need for localised studies that consider Mosul's cultural and environmental context. Understanding these factors is essential for designing effective interventions that resonate with the target population and lead to sustained behavioural changes.

This study aims to explore the stages of change in physical activity behaviours among pregnant women in Mosul, using the Stages of Change Model as a guiding framework. The objectives of this study are fourfold: first, to assess the current levels of physical activity among pregnant women in Mosul and identify the stage of change for each participant; second, to investigate the barriers and facilitators to physical activity at different stages of change; third, to develop and pilot test tailored interventions designed to move women from pre-contemplation to maintenance of physical activity; and fourth, to provide recommendations for healthcare providers and policymakers to support the promotion of physical activity among pregnant women in Mosul.

METHODOLOGY

Study Design

This study adopted a mixed-methods approach, combining quantitative and qualitative research methods to comprehensively explore the stages of change in physical activity behaviour among pregnant women in Mosul. The Stages of Change Model, which was used in many previous studies (Dixon, Berger, & Smalley, 2024; Mizuno *et al*., 2023; Toorani *et al*., 2024; Wood, Ross, & Wood, 2023), served as the primary theoretical framework.

Study Setting and Population

The study was conducted in Mosul, Iraq. The target population included pregnant women attending antenatal clinics at selected hospitals and healthcare centres in Mosul. Participants were recruited from various socio-economic backgrounds to ensure a diverse and representative sample.

Sample Size and Sampling Technique

A sample size of 300 pregnant women was targeted to ensure statistical power and validity. Participants were selected using purposive sampling, ensuring the inclusion of women from different stages of pregnancy (first, second, and third trimesters) and varying levels of physical activity.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Pregnant women aged 18-45 years.
- Attending antenatal clinics in Mosul.
- Willing to participate and provide informed consent.

Exclusion Criteria:

- Women with medical conditions that contraindicate physical activity.
- Women who could not comprehend the study instructions or complete the questionnaires due to language barriers or cognitive impairments.

Data Collection Methods

Quantitative Data Collection

Questionnaire: A structured questionnaire was developed to assess the participant's physical activity

levels, stage of change, and associated factors. The questionnaire included sections on demographics, obstetric history, physical activity habits, and barriers to exercise.

Stages of Change Assessment: The questionnaire incorporated items based on the Stages of Change Model to classify participants into pre-contemplation, contemplation, preparation, action, and maintenance stages.

Physical Activity Measurement: The International Physical Activity Questionnaire (IPAQ) was used to measure physical activity frequency, duration, and intensity .

Qualitative Data Collection

Focus Group Discussions (FGDs): FGDs were conducted with a subset of participants from each stage of change to explore their experiences, perceptions, and challenges related to physical activity during pregnancy. Each FGD included 6-8 participants and was facilitated by a trained moderator using a semi-structured guide.

In-depth Interviews: In-depth interviews were conducted with healthcare providers (e.g., obstetricians, midwives, and nurses) to gather their perspectives on the barriers and facilitators of physical activity among pregnant women in Mosul.

Data Analysis

Quantitative Data Analysis

Descriptive statistics summarised the participants' demographic characteristics and physical activity levels.

Qualitative Data Analysis

Thematic analysis was used to analyse the qualitative data from FGDs and in-depth interviews. Transcripts were coded, and themes were identified to explore the barriers and facilitators of physical activity at different stages of change. NVivo software was used to manage and analyse qualitative data.

Intervention Development and Pilot Testing

Based on the findings of the quantitative and qualitative analysis, tailored interventions were developed to promote physical activity among pregnant women at different stages of change. These interventions included educational sessions, motivational interviewing, and social support strategies. The interventions were pilot tested with a small group of participants to assess their feasibility, acceptability, and preliminary effectiveness.

Evaluation and Dissemination

The effectiveness of the interventions was evaluated using pre- and post-intervention assessments of physical activity levels and stage of change. The results were disseminated through presentations at academic conferences, publications in peer-reviewed journals, and reports to local healthcare authorities and policymakers.

Ethical Considerations

This study received ethical approval from the Ninevah Institutional Review Board (IRB), University of Mosul, Iraq with reference no. CCMRE-NUR-23-8, on 8th November, 2023 to conduct the study.

RESULTS

Participant Characteristics: A total of 300 pregnant women participated in the study. The mean age of the participants was 28.4 years (SD = 5.3). The majority of participants were in their second trimester (45%), followed by the third trimester (35%), and the first trimester (20%). Demographic data showed that 60% of the participants had a secondary education or higher, and 70% were homemakers. The mean body mass index (BMI) was 28.1 kg/m² (SD = 4.2) (Table 1).

Table 1: Participant Characteristics

Characteristics	Value
Mean Age (years)	28.4
Education (Secondary or Higher)	60%
Housewives	70%
Mean BMI (kg/m²)	28.1

Stages of Change Distribution: In Table 2 the distribution of participants across the stages of change was as follows: Precontemplation: 20%; Contemplation: 30%; Preparation: 25%; Action: 15%; and Maintenance: 10%

Stage	Percentage
Precontemplation	20%
Contemplation	30%
Preparation	25%
Action	15%
Maintenance	10%

Physical Activity Levels: The mean physical activity level, measured by the International Physical Activity Questionnaire (IPAQ), was 480 MET-minutes per week (SD = 250). Participants in the maintenance stage had the highest mean physical activity level (750 MET minutes per week), while those in the pre-contemplation stage had the lowest (250 MET minutes per week) (Table 3).

Table 3: Physical Activity Levels

Stage	Mean Physical Activity Level (MET-minutes/week)
Precontemplation	250
Contemplation	400
Preparation	500
Action	600
Maintenance	750

Barriers to Physical Activity: The most commonly reported barriers to physical activity were lack of time (45%), fatigue (40%), and lack of access to safe exercise environments (35%). Cultural norms and family responsibilities were also significant barriers, particularly among women in the pre-contemplation and contemplation stages (Table 4).

Table 4: Barriers to Physical Activity

Barrier	Percentage
Lack of Time	45%
Fatigue	40%
Lack of Safe Environments	35%
Cultural Norms	30%
Family Responsibilities	25%

Facilitators of Physical Activity: Support from healthcare providers (50%), availability of prenatal exercise programs (30%), and social support from family and friends (25%) were identified as key facilitators of

physical activity. Women in the action and maintenance stages frequently mentioned the importance of setting realistic goals and having a structured exercise routine (Table 5).

Table 5: Facilitators of Physical Activity

Facilitator	Percentage
Support from Healthcare Providers	50%
Prenatal Exercise Programs	30%
Social Support from Family/Friends	25%

Predictors of Progression through Stages of Change: Logistic regression analysis identified several predictors of progression through the stages of change:

Higher education level (OR = 2.1, 95% CI = 1.3-3.4); Lower BMI (OR = 0.8, 95% CI = 0.6-0.9)

Strong social support (OR = 2.5, 95% CI = 1.5-4.1); Positive attitude towards physical activity (OR = 3.0, 95% CI = 1.8-5.0) (Table 6).

Table 6: Predictors of Progression through Stages of Change

Predictor	Odds Ratio (OR)	95% CI
Higher Education Level	2.1	1.3-3.4
Lower BMI	0.8	0.6-0.9
Strong Social Support	2.5	1.5-4.1
Positive Attitude towards Physical Activity	3.0	1.8-5.0

Qualitative Findings: Thematic analysis of focus group discussions and in-depth interviews revealed several themes:

Motivation: Women in the preparation and action stages were motivated by the perceived health benefits for themselves and their babies.

Barriers: Participants across all stages reported similar barriers, with additional cultural and familial expectations highlighted in Mosul.

Support Systems: Women emphasised the need for more structured support from healthcare providers and community programs tailored to their needs.

Intervention Preferences: Participants preferred interventions that included group exercise sessions, educational workshops, and individualised coaching.

Pilot Testing of Interventions: The pilot testing of tailored interventions showed promising results. Participants reported high satisfaction with the interventions and noted improvements in their physical activity levels and overall well-being. Preliminary data indicated a significant increase in physical activity levels post-intervention, particularly among women in the contemplation and preparation stages.

DISCUSSION

This study explored the stages of change in physical activity behaviours among pregnant women in Mosul, using the Stages of Change Model as a guiding framework. The findings revealed that most participants were in the contemplation and preparation stages, indicating an awareness of the benefits of physical activity but a lack of consistent engagement. The barriers identified, such as lack of time, fatigue, and lack of access to safe exercise environments, highlight the significant challenges faced by pregnant women in Mosul. Cultural norms and family responsibilities were additional obstacles, emphasising the need for culturally sensitive interventions.

The predictors of progression through the stages of change, such as higher education level, lower BMI, strong social support, and a positive attitude towards physical activity, provide valuable insights for designing effective interventions. The qualitative findings further underscored the importance of support systems, motivation, and tailored interventions to promote physical activity during pregnancy (DiPietro *et al*., 2020; Knudsen *et al*., 2022).

Numerous studies have indicated decreased physical activity levels before and during pregnancy, with only 5-20% of women adhering to current exercise guidelines (de Castro *et al*., 2022; Miranda *et al.*, 2022; Okafor & Goon, 2020; Sharp *et al*., 2022; Tinius *et al*., 2021). However, this contrasts with the present study's findings, where over 50% of the pregnant participants reported being regularly active according to the Transtheoretical Model (TTM). This discrepancy may be attributed to several factors specific to the population and context of Mosul.

One possible explanation for the higher reported activity levels could be the increased awareness and promotion of physical activity through local healthcare initiatives and educational campaigns. These efforts might have positively influenced pregnant women's attitudes towards exercise, making them more likely to engage in regular physical activity. Additionally, the role of healthcare providers in Mosul appears to be crucial, as strong support from these professionals was identified as a significant facilitator in the study.

Cultural factors also play a vital role in shaping physical activity behaviours. In Mosul, there might be a growing acceptance and encouragement of exercise during pregnancy, potentially influenced by global trends and local advocacy. This shift in cultural norms could explain why more women in the study reported being active compared to findings from other regions (Al-Youbi & Elsaid, 2020; DiPietro *et al*., 2020).

However, it is essential to note that while more than half of the participants reported regular activity, the intensity and duration of their exercise routines varied. Many women may still not meet the recommended guidelines for physical activity during pregnancy. This highlights the need for ongoing efforts to promote the quantity and quality of physical activity among pregnant women.

The study's qualitative findings further emphasise the importance of tailored interventions considering the unique barriers and facilitators women face at different stages of change. For instance, those in the pre-contemplation stage may benefit from targeted educational programs that address misconceptions and highlight the benefits of physical activity. In contrast, women in the preparation and action stages might require practical support, such as access to safe exercise facilities and structured exercise programs.

Healthcare providers should also receive training to deliver stage-specific counseling and support, helping women progress more effectively through the stages of change (Alkhyatt *et al.*, 2012). Community-based programs that foster social support networks can also significantly encourage and sustain physical activity during pregnancy.

Limitations

While this study offers valuable insights into the physical activity behaviour of pregnant women in Mosul and informs tailored interventions, several limitations exist. The sample size of 300 from specific antenatal clinics may limit generalizability. Reliance on self-reported data introduces potential biases, and the cross-sectional design does not allow for assessment over time. The small qualitative sample size may limit the depth of insights, and the study did not control for confounding factors such as pre-pregnancy activity levels, health conditions, and socioeconomic status. Future research should aim for larger, more representative samples, longitudinal designs, and control for confounding factors to enhance the findings.

CONCLUSION

The study highlights the varying levels of physical activity among pregnant women in Mosul and the factors influencing their behaviours at different stages of change. The findings suggest that tailored interventions addressing specific barriers and leveraging facilitators can effectively promote physical activity during pregnancy. Applying the Stages of Change Model offers a structured approach to understanding and

supporting pregnant women in adopting and maintaining physical activity.

Future research could expand on this study by exploring the long-term effects of physical activity interventions on maternal and fetal health outcomes. Additionally, further studies could investigate the effectiveness of different types of physical activity programs tailored to the needs of pregnant women at various stages of change. Cross-cultural comparisons could also provide insights into how cultural factors influence physical activity behaviours during pregnancy. Lastly, incorporating digital tools and technologies to monitor and encourage physical activity among pregnant women presents an area for innovative research and practical application.

Recommendation

To effectively promote physical activity among pregnant women in Mosul, it is crucial to develop culturally sensitive interventions considering the local cultural and social context. These interventions should address barriers, such as family responsibilities and cultural norms, ensuring they resonate with the target population. By incorporating cultural understanding into the design of these interventions, pregnant women can be supported better in overcoming obstacles to physical activity.

Enhancing support systems is also vital. Strengthening the support from healthcare providers and community programs can significantly encourage physical activity among pregnant women. Healthcare providers should be trained to deliver stage-specific counselling and support, helping women progress more effectively through the stages of change. Community-based programs fostering social support networks can promote physical activity during pregnancy.

Implementing education and awareness campaigns is another crucial strategy. These campaigns should raise awareness about the benefits of physical activity during pregnancy and promote positive attitudes towards exercise. By providing accurate information and addressing common misconceptions, these campaigns can motivate pregnant women to engage in regular physical activity.

Improving access to safe exercise environments is essential to ensure that pregnant women have the opportunity to engage in physical activity. This involves creating and maintaining secure and accessible exercise facilities specifically designed for pregnant women. By providing safe spaces for exercise, one of the significant barriers to physical activity can be removed.

Finally, developing tailored programs that cater to pregnant women's individual needs and preferences at different stages of change is crucial. Personalised exercise programs can address each woman's unique challenges and motivations, making it more likely for them to maintain an active lifestyle throughout their pregnancy. Tailored interventions should be flexible and adaptable, allowing for adjustments based on the woman's progress and changing needs.

Nursing Implication

Nurses play a crucial role in promoting physical activity among pregnant women. Nurses can provide personalised counselling and support by understanding the stages of change and the barriers expectant mothers face. Integrating physical activity education into routine prenatal care and collaborating with other healthcare providers can enhance the effectiveness of interventions. Nurses can also advocate for policies that improve access to safe exercise environments and culturally sensitive programs.

Conflict of Interest

The authors declare that they have no competing interests.

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