The impact of interactive video-based exercise on quality of life among pregnant women in Indonesia: A pilot study

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Abstract

Background: Pregnant women experience lower quality of life compared to the general population and experience a decrease in their quality of life as their pregnancy progresses. Video interactive provides an interesting and interactive environment, so participants would be more likely to enjoy completing their physical activity regimen.
Purpose: This study aimed to determine the impact of video interactive-based exercise on quality of life among pregnant women in Indonesia.
Methods: A quasi-experimental study was carried out in Bandung, West Java, Indonesia from August 2023 to January 2024. The intervention and control groups involved healthy pregnant women aged above 18 years old, second trimester pregnant, advised by healthcare, literate, and willing to participate in physical activity. The study involved 264 pregnant women, with a response rate of 96%. Data was collected before (T0), immediately after (T1), and 2 weeks after the intervention (T2). The videos covered combination of exercise program for pregnant women, including warm-up, main phase (with an aerobic element, followed by strength and endurance exercises) and final stretching and relaxation. quality of life was measure using quality of life Gravidarum. The analysis was evaluated using repeated ANOVA test and difference-in-difference estimate.
Results: After a two-week follow-up, the intervention group showed a substantial increase in quality of life scores, with a moderate level of impact (effect size= 0.39). The difference-in-difference estimate showed a modest increase of 3.57 percentage points between groups.
Conclusion: The study demonstrated that video interactive exercise significantly improved the quality of life for pregnant women, indicating the potential for encouraging their participation in such activities.

Keywords: exercise, pregnant women, quality of life, video interactive

Jurnal Keperawatan Padjadjaran (JKP)

Volume 13(1), 66-73
© The Author(s) 2025
http://dx.doi.org/10.24198/jkp.v13i1.2565

Article Info

Received : July 03, 2024
Revised : April 20, 2025
Accepted : April 26, 2025
Published : April 28, 2025

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Citation

Marfuah, D., Sansuwito, T., & Ayakannu, R. (2025). The impact of interactive video-based exercise on quality of life among pregnant women in Indonesia: A pilot study. *Jurnal Keperawatan Padjadjaran, 13*(1), 66-73. http://dx.doi.org/10.24198/jkp.v13i1.2565

Website

http://jkp.fkep.unpad.ac.id/index.php/jkp

E-ISSN: 2442-7276
P-ISSN: 2338-5324

Introduction

Quality of life (QoL) is defined by the World Health Organization (WHO) as “an individual’s perspective on their own life in light of their own cultural and value system, and in light of the importance they attribute to various aspects of their own life” (WHO, 2012). A previous study found that pregnant women experience lower quality of life compared to the general population and experience a decrease in their quality of life as their pregnancy progresses (Boutib et al., 2022a; Lagadec et al., 2018). Pregnant women at third trimester showed lower quality of life than in first and second trimester (Boutib et al., 2022b). Quality of life is influenced by material living conditions, psychosocial risks, work-related ill-being, lack of confidence in society, weak social ties, economic and physical insecurities, and health ; (Boutib et al., 2022a; Divilly et al., 2022; Lagadec et al., 2018; Shams et al., 2022) Prenatal quality of life can negatively affect postpartum life, increasing the risk of postpartum depression, labor complications, or birth defects (Mogos et al., 2013).

Physical activity is a modifiable health risk factor that positively impacts

maternal mental health and quality of life. The 2019 Canadian guideline for physical activity during pregnancy advises all pregnant women, except those with contraindications, to engage in at least 150 minutes of moderate-intensity physical activity, at least three days per week, to achieve clinically meaningful health benefits and reduce pregnancy complications (Vargas-Terrones et al., 2019) Women with higher quality of life reported higher energy expenditures related to occupational, sport/ exercise, and strenuous activities (Krzepota et al., 2018). Pregnancy-induced physical activity can reduce fatigue, tension, anxiety, and depression, and enhance breastfeeding outcomes (Nguyen et al., 2018; Vargas-Terrones et al., 2019). Another study suggested that prenatal exercise positively impacts prenatal depression but not anxiety or postpartum depression (Davenport et al., 2019; Takeishi et al., 2019). Ameta-analysis found that exercise significantly reduces anxiety and stress levels, improving overall quality of life (Liu et al., 2019). Despite its advantages, studies show a significant decrease in prenatal physical activity among pregnant women (Cooper et al., 2020; T. L. C. Nascimento et al., 2021). A study found that 75.2% of 109 pregnant women were sedentary, with slow walking being the most common type of exercise (Szablewska et al., 2023). Similarly, a study in Indonesia found that over half of pregnant women were sedentary (Astuti et al., 2021).

In Indonesia, intervention to promote quality of life among pregnant women have been studied. For example, using application-based education with social cognitive therapy, however the study focuses on pregnant women with gestational diabetic mellitus (Ariyani et al., 2022). Additionally, mindfulness interventions, progressive muscle relaxation, and murothal Al-Qur'an therapy have shown significant improvements in the quality of life of pregnant women (Aswitami et al., 2021; Indrawati et al., 2022). However, these interventions often require multiple in-person sessions, limiting accessibility for women in rural or resource-limited settings.

Interactive video-based interventions offer unique advantages compared to traditional or static approaches. Unlike standard in-person or app-based programs, interactive video formats can enhance engagement and adherence through real-time feedback, visual demonstrations, and customizable pacing. These features make the intervention more enjoyable and user-friendly, potentially improving long-term compliance. Additionally, video interventions can be accessed remotely, eliminating geographical barriers and allowing for greater scalability. Recent evidence suggests that video-based interventions can effectively increase physical activity levels in pregnant women, contributing to better maternal and fetal outcomes (Wowdzia et al., 2021). Structured exercise programs delivered via digital platforms have been shown to reduce anxiety and depression, enhance mental health, and improve overall quality of life (Sbrilli et al., 2020; Yang et al., 2019). By integrating interactive features tailored to the needs of pregnant women, this approach could amplify these benefits, offering a holistic solution for improving both physical and psychological health during pregnancy.

While previous interventions have demonstrated some effectiveness in enhancing quality of life, there is a limited focus on scalable, accessible, and culturally relevant solutions that integrate physical activity into pregnancy care (Sbrilli et al., 2020; Wowdzia et al., 2021; Yang et al., 2019). Few studies have investigated the use of technology, specifically video-based interactive interventions, to address the dual physical and psychological challenges faced by pregnant women, particularly in Indonesia. Therefore, this study aimed to determine the impact of video interactive-based exercise on quality of life among pregnant women in Indonesia.

Materials and Methods

Study design

A quasi-experimental study was carried out in Bandung, West Java, Indonesia from August 2023 to January 2024. Data was collected before (T0), immediately after (T1), and 2 weeks after the intervention (T2).

Sample

The inclusion and exclusion criteria for both intervention and control groups were as follows: healthy pregnant women aged 18 years or older, pregnant women in their second trimester, advised by a healthcare professional to engage in physical activity, literate, and willing to participate in the study. Pregnant women with mental health issues or pregnancy complications were excluded. Participants underwent a preliminary screening process conducted by healthcare professionals to ensure they met the inclusion and exclusion criteria. This process involved interviews, a review of medical records, and a short physical examination to confirm eligibility.

The sample size was calculated using G-Power Software Version 3.1.9.4 for a t-test, with a significance level of 0.05, an estimated effect size of 0.40 (Cohen, 1992), a power level of 0.80, two groups, and three repeated measures.

Participants were allocated to either the intervention or control group using a convenience sampling method. Allocation was performed sequentially based on the order of enrollment until the required sample size for each group was achieved. While convenience sampling may have limitations in randomization, efforts were made to ensure baseline characteristics between the groups were comparable through statistical analysis prior to the intervention.

Instrument

The demographic data sheet included information on pregnant women, such as age (in years at time of

data collection), level of education (primary school, secondary school, university or college), occupation (yes/no), gestational age (in week at time of data collection), parity (number of live children), and body mass index (body wight and height).

The quality of life gravidarum (QOL-GRAV) is a questionnaire designed to assess the quality of life of women during normal pregnancy (Zarei et al., 2018). It consists of nine items, rated on a 5-point Likert scale, and is designed as a supplement to the WHOQOL-BREF. Some items are supplemented by open-ended questions for more detailed descriptions of changes during pregnancy and coping strategies. The interpretation of the QOL-GRAV scale suggests that a lower score indicates a higher quality of life. The mean scores of the QOL-GRAV scale are generally lower than those of the WHOQOL-BREF questionnaire. The quality of life is rated as outstanding (9–18 points), very good (19–27 points), good (28–36 points), and not very good (937–45 points) based on the total score. The internal reliability in original study was 0.72 to 0.75 (Vachkova et al., 2013). The internal reliability in this study was 0.86.

Intervention

The intervention was intended for pregnant women who qualified based on the study's inclusion criteria. Immediately after undergoing the baseline assessments, participants assigned to the intervention group received access (via text message) to a standardized interactive video. This video was created to equalize access to the UEC and a guided, structured exercise regimen, consistent with established clinical practice guidelines. The intervention was conducted over four weeks, initiated by a 90-minute education and support session led by trained nurses and research personnel in week 1.

The video was a joint effort created by a multidisciplinary team, including a maternal health nurse educator, an exercise physiologist and an obstetrician. Its design was guided by evidence-based recommendations, exercise protocols tailored to accommodate the particular safety and health needs of pregnant women (adapted from Aguilar Cordero et al., 2016). The video content was validated by three external experts (1 senior obstetrician, 1 prenatal physiotherapy specialist and 1 midwifery academic) prior to its usage in the study to assess its clinical relevance, clarity and cultural appropriateness. To improve the instructional quality and usability of the video, it was revisited and reviewed multiple times based on their feedback.

The finished video clocked at around 45 minutes and was broken into sections, including a warm up, aerobic portion, strength and endurance exercises, cool down and stretching and relaxation section. To avoid any confusion and miscommunication through verbal strategies instead (tapping and clapping), visual columns were added. The video even had interactive elements where participants could pause and practice movements in real-time and then also be prompted to do self-reflection. They were specifically crafted to encourage action, inspire trust, and reinforce learning.call to action

Eight trained research assistants were recruited (two for each intervention group) with a nursing or public health background, who delivered the program. These assistants also were tasked with onboarding participants, providing technical support, and conducting weekly follow-ups and logbook reviews. In the first 90-minute session, the nurse and the designated assistant led participants through the exercises to ensure they were performed correctly and that it was safe to do so, particularly for exercise at home. All participants were provided with a standardized logbook for self-monitoring purposes. They were asked to log their daily exercise regimes such as duration, heart rate (assessing at home manually or using a personal device), perceived level of exertion and issues or discomfort encountered. Research assistants reviewed these records via phone or video consultations on a weekly basis. In addition, participants were provided coaching on how to stay within the protocol if deviations were identified.

The informational session also highlighted goal-setting as a source of motivation. Participants were invited to use their subjective definitions of minimum physical activity levels, validated with weekly SMS or telephone reminders. The lead researchers developed a standard reminder template to ensure a consistent approach to communication. This template could be easily tailored to each participant while maintaining the essence of the message, the research assistants could simply adjust the wording or drop unnecessary details. Each research assistant contributed an average of 8 to 16 hours per week of study support, depending on the needs for onboarding participants and monitoring their adherence. The core research team provided both in-person and virtual support to maintain fidelity to the intervention. A coordinated training initiative was developed for the entire team, as well as a detailed implementation protocol to ensure standardization of intervention delivery across study sites.

The control group continued receiving standard clinical care without the physical activity program and without additional supports. The participants in both the intervention and control groups were monitored during the entire study for adherence to the protocol and to keep the research outcomes valid.

Procedure

Prior to implementing the intervention, baseline data was collected using a standardized questionnaire that was sent using the Google Form platform. To minimize the possibility of inaccurate data entry or participant confusion, the form was filled out with detailed, step-by-step instructions. Eight competent study assistants, all with degrees in nursing, lent

Table 1. Demographic comparison between intervention and control group (N=240)

Variables	Intervention group n=120 (%)	Control group n=120 (%)	p-value
Age, years, Mean ± SD	26.67 ± 4.65	27.13 ± 3.25	0.672
Education level			0.134
Primary school	45 (37.5)	40 (33.3)	
Secondary school	63 (52.5)	64 (53.3)	
Higher than secondary school	12 (10)	16 (13.3)	
Employment status			0.076
Yes	45 (37.5)	52 (43.3)	
No	75 (62.5)	68 (56.7)	
Gestational age (years), Mean ± SD	20.3 ± 3.55	21.9 ± 2.11	0.228
Number of children, Mean ± SD	2.1± 0.23	2.5 ± 0.41	0.089
Body mass index, Mean ± SD	28.21± 4.56	29.01 ± 5.01	0.176

Table 2. Within group comparison of quality of life using ANOVA and Cohen's d test

Variable	T0	T1	T2	F	ANOVA Test	Cohen's d
	Mean ± SD	Mean ± SD	Mean ± SD		p-value	
Intervention group	85.51 ± 12.8	90.11 ± 17.4	92.54 ± 20.33	13.76	0.001	0.39
Control group	87.32 ± 15.5	86.76 ± 13.2	83.34 ± 15.7	-2.32	0.037	0.03

Note: P < 0.05 are considered significant; Note: before (T0), immediately after (T1), 2 weeks after the intervention (T2), respectively.

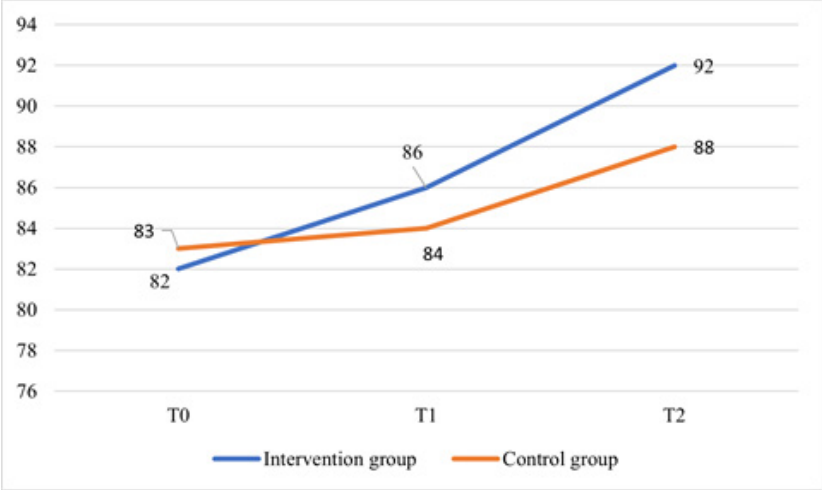

Figure 1. Change in quality of life between intervention and control groups overtime
Note: DDE: difference-in-difference estimate; ***: p < 0.001

credence to this method by walking participants through each step. These assistants are available in real-time via Zoom meetings and can handle issues like answering inquiries, clarifying concepts, fixing technical issues, and checking the accuracy of submitted answers.

The intervention consisted of a four-week exercise program led by videos that aimed to enhance stability, stamina, and strength. Physiotherapists, sports science professors, and nurse educators with expertise in community health were the members of the interdisciplinary team who collaborated to develop the exercise program. The program was tailored to the specific needs and skills of the study group, based on evidence-based recommendations for functional fitness. Prior to its implementation, the video was given the go light by rehabilitation experts who were well-versed in home-based exercise

programs. The clinical relevance, instructional clarity, and safety of the exercises were ensured by their remarks, especially for unmonitored use. Ten participants who were not included in the main study saw the film as a pilot to see how well it was understood and how easy it was to use.

A total of two hundred forty-four people were involved in the study. Their participation in the intervention was closely monitored by both the primary researchers and the research assistants. Contributions were time-stamped, participants were invited to join a specialized WhatsApp group, and participants were asked to check in at certain intervals during the week. Each research assistant had 33 participants to assist, compliance to be tracked weekly, and any signs of disengagement or lack of reactivity to be reported immediately to the primary investigator. To ensure that participants would respond to the post-intervention assessment, we used both email and WhatsApp to send them reminders. In order to guarantee consistency in communication, the research team developed a standardized message template. Reminders were sent two days before to the scheduled submission, on the day of the actual due date, and a third time two days later in the event that no response had been obtained.

Two weeks after the conclusion of the program, data was collected using the same Google Form platform used for the baseline survey. The study team oversaw the whole data collection and monitoring process; it consisted of two primary investigators and three associate researchers. In order to ensure consistency in procedures, the team had an alignment meeting before the intervention. Consistent check-ins during the intervention period ensured that all study participants cooperated and followed the procedure.

Data analysis

The analyses included frequency, mean, and standard deviation. The average difference in quality of life score overtime was calculated using repeated measure ANOVA test. The effect size was computed using the Cohen's d test. The efficiency of the intervention was evaluated using a difference-in-difference estimate (DDE). SPSS version 26 was used to code and analyze the data.

Ethical consideration

The research was approved by the International Review Board (IRB) of STIKep PPNI Jawa Barat, Indonesia. Before data collection, a detailed explanation of the study's objectives, methodologies, potential risks, and benefits was provided to all participants through an information session conducted online. Participants were assured of the confidentiality and anonymity of their responses, in line with ethical research practices. Written informed consent was obtained from each participant electronically using a Google Form consent sheet. Data were securely stored on a password-protected cloud platform accessible only to the research team, further safeguarding participants' privacy.

Results

The baseline data gathering involved 264 pregnant women in a cohort, with 20% of patients choosing not to participate, resulting in a response rate of 96%. The intervention group had an average age of 27.13 years and a standard deviation of 3.25. Furthermore, 52.5% of the participants had finished senior high school education. The mean gestational age was determined to be 20.3 ± 3.55 weeks. The mean number of children reported by the participants was 2.1 ± 0.23. The average body mass index (BMI) was determined to be 28.21 ± 4.56 (Table 1).

In the control group, the average age was 21.9 ± 2.11, and 53.3% of individuals had completed senior high school education. The mean gestational age was 35.9 years with a standard deviation of 2.11, the mean number of children was 2.5 with a standard deviation of 0.41, and the mean body mass index was 29.01 with a standard deviation of 5.01. No statistically significant differences were observed between the intervention and control groups regarding age, education, gestational age, number of children, and body mass index ($p>0.05$) (Table 1).

The repeated measures analysis of variance (ANOVA) showed a substantial rise in quality of life scores within the intervention group following a two-week follow-up. The effect size of 0.39 indicates a moderate level of impact. There was no significant increase in quality of life in the control group, as indicated by an effect size of 0.03, suggesting a negligible impact size (Table 2).

Figure 1 illustrates the change in quality of life over time in both the intervention and control groups. The intervention group saw an improvement in their overall quality of life score from T0 to T2. The difference-in-difference estimate (DDE) showed a modest rise of 3.57 percentage points. Throughout the trial period, the control group did not show any statistically significant improvement in quality of life.

Discussion

This study demonstrated that video interactive-based exercise led to a significant improvement in quality of life scores. The significant improvement in quality of life scores observed with video interactive-based exercise aligns with growing evidence supporting the role of digital health interventions in enhancing physical and mental well-being. Previous studies have shown that technology-mediated exercise programs can facilitate greater engagement and adherence compared to traditional exercise modalities (Zheng et al., 2023). The interactive nature of video-based exercises may promote a more enjoyable and accessible fitness experience, potentially reducing barriers such as lack of motivation and time constraints. According to a systematic review by Smith et al., 2022, participants

in video-based interventions reported higher levels of satisfaction and perceived enjoyment, which are crucial factors in maintaining long-term physical activity.

Moreover, the social components often integrated into these programs—such as virtual classes or community challenges—can foster a sense of belonging and support, further enhancing participants' motivation and commitment (Johnson et al., 2024). This aligns with the findings of Villa-(García et al., 2023), who noted that social support mechanisms are critical in improving exercise adherence and overall mental health outcomes. In addition, the COVID-19 pandemic has accelerated the adoption of digital health solutions, leading to a greater focus on home-based exercise interventions. The versatility of video-based exercise can cater to diverse populations, including those with limited mobility or those living in remote areas, thus broadening access to quality health resources (Thorpe et al., 2023).

Finally, while the results are promising, future research should explore the long-term effects of video interactive-based exercise on quality of life and investigate the specific components that contribute most significantly to these improvements. Tailoring interventions to individual preferences and needs may further enhance their effectiveness (Fang et al., 2024).

A systematic review found that exercise had a significant positive impact on the quality of life of pregnant women. Additionally, two out of the four studies indicated that resistance training could enhance the quality of life of pregnant women. This review presents evidence that exercise is a practical, acceptable, and beneficial intervention for improving women's quality of life during pregnancy, despite inconsistent outcomes from different studies (Liu et al., 2019). Barakat et al., (2011)conducted a study on 80 healthy pregnant women. The experimental group engaged in a moderate exercise program (35–45 min) three days a week from weeks 6–8 to 38–39 of pregnancy. These authors, like us, found that engaging in a program of moderate physical activity throughout all three trimesters of pregnancy enhances the mother's subjective health condition. Nevertheless, other research studies did not demonstrate a notable improvement in the quality of life for overweight/obese women who exercise (S. L. Nascimento et al., 2011) or pregnant women who engage in water gymnastic training (Vallim et al., 2011).

This study found a significant difference between groups in terms of quality of life. These basic nursing measures are part of daily patient care and nurses provide conventional oral education so frequently that presenting this education through video interactive exercises may not seem different to the patient. Video interactive-based exercise helps patients grasp the technique before the actual exercise, avoiding the need to absorb important information at inconvenient moments. Traditional educational approaches are typically carried out by healthcare professionals to instruct patients on exercising at a specific period. Patients frequently forget steps and need guided re-training for complex exercise routines at the end of their education. The intervention group in the study may independently evaluate the processes using interactive films, allowing them to preview the exercise process and revisit the experience as many times as necessary. However, the data could not be analyzed for the long-term effects of the intervention due to the absence of long-term follow-up. The research design can be enhanced in the future.

This study is a quasi-experimental study that is prospective in nature, where the intervention comes before the effect, establishing a very convincing causal relationship with feasibility and practicality. Clinical nursing research often use this method, which lacks randomized grouping and a control group, making it challenging to conclusively ascribe the results to the intervention, therefore reducing its credibility compared to experimental trials. The baseline surveys for the control group and intervention group in this study were uniform. Simultaneously, when comparing the two groups during the same timeframe, giving video access just to the intervention group could lead to interference causing a halo effect as a result of sharing the videos.

Conclusion

A video interactive exercise showed a significant enhancement in the quality of life for pregnant women. This study showed that it is possible to encourage pregnant women to engage in video interactive-based exercise. Future studies could conduct a long-term study to assess the sustained effects of video interactive exercises on the quality of life for pregnant women throughout different trimesters and postpartum. Moreover, examine the role of user engagement with video interactive content (e.g., frequency of use, preference for types of exercises) in influencing quality of life improvements.

Declaration of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Acknowledgments

We thank all the study participants for their cooperation.

Funding

This study was supported by STIKep PPNI Jawa Barat, Indonesia.

Data availability

The raw data supporting the conclusions of this

article will be made available as requested to the corresponding authors.

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