

A Pilot Study on Physical Activity and Perceived Barriers and Benefits During Pregnancy

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Abstract

Physical activity undertaken during pregnancy is well established to have a significant positive impact upon overall maternal health and birth outcomes. Despite this strong evidence, our knowledge of the level of physical activity undertaken by pregnant women and the perceived barriers and benefits of participating in exercise during pregnancy is poorly understood. Within this pilot investigation we determined the level of physical activity during pregnancy and their attitudes toward maternal exercise. Twelve gravid women (aged 34 ± 4.6 y), at various stages of pregnancy (38.0 ± 5.2 wk) who attended the Royal Hospital for Women, Sydney, Australia, volunteered to take part in preliminary questionnaire through semi-instructed interview and complete a survey on their experience in physical activity prior to and during pregnancy. The investigation was approved by the Human Research Ethics Committee of the Royal Hospital for Woman, Randwick, Australia. Mean METs-h \cdot wk⁻¹ values of physical activity domains reported of (34.9MET-h \cdot wk⁻¹). Occupational activity was the highest contribution to energy expenditure with 26.7MET-h \cdot wk⁻¹, whereas the lowest contribution was exercise accounted 0.7MET-h \cdot wk⁻¹. Participants reported light intensity (12.2MET-h \cdot wk⁻¹) as the highest level. Vigorous intensity was the lowest and more limited recorded 0.5MET-h \cdot wk⁻¹. A majority of women (60%) reported exercising regularly prior to pregnancy with five (5) of these women involved a structured physical training regimen prior to pregnancy. A majority of women (74.7%) reported walking was the most preferred activity during pregnancy. Levels of moderate-leisure activity (0.4 ± 1.2 sessions \cdot wk⁻¹, 0.7 ± 2.3 hrs \cdot wk⁻¹, 2.5METs-h \cdot wk⁻¹) and strong-leisure activity (0.3 ± 1.2 sessions \cdot wk⁻¹, 0.5 ± 1.7 hrs \cdot wk⁻¹, 2.3METs-h \cdot wk⁻¹) declined significantly ($p < 0.05$). Improved well-being was perceived in half the participants as the most significant benefit they perceived from engaging in exercise. However, growing body size and tiredness was identified by five (5) and four (4) women respectively as significant barriers to participation in physical activity.

Keywords: Physical Activity; Pregnancy; Barriers; Benefits

Introduction

Pregnant women in the absence of obstetric or medical complications are advised to accumulate 30 minutes or more of moderate intensity activity per day on most, if not all days of the week. These recommendations are similar to the minimum level of physical activity recommended for normal healthy adults. Only 50% of non-pregnant women currently meet the physical activity guidelines, and this participation rate declines to 12-33% during pregnancy [1,2]. However, the survey and self-report tools used to estimate physical activity in pregnant women often do not estimate occupational, household or childrearing tasks within the analyses of physical activity patterns (Schmidt et al., 2006). Thus, the level of physical activity reported in the literature may well be an underestimation of actual the activities undertaken by these women.

Significant benefits are afforded to women who engage in physical activity prior to and during pregnancy [3-8]. These women are more likely to have reduced complications during birth, improved recovery post-partum and their quality of life [9,10]. The majority of women (94%) believe that participating in exercise will improve labour, delivery and health outcomes of their baby [5,10]. Notwithstanding this belief, 60-80% of pregnant women will fail to engage in sufficient physical activity during the gravid and post-partum periods [4,11,12] This decline manifests as lower exercise duration, frequency and intensity of exercise compared to non-pregnant women [13,14].

Thus, despite women having an awareness of the benefits of engaging in exercise as positive health behaviour, most pregnant women do not participate in sufficient levels of physical activity. It is well established that an individual's perception of the benefits and barriers associated with an activity will significantly influence their ability to adopt a health enhancing behaviour [4,5,9,15]. Excessive fatigue, insufficient time and physical limitations due to size have been identified as barriers to physical activity during pregnancy [9, 16-18]. Furthermore, environmental factors such as the lack of appropriate facilities, access to childcare or transport have been reported to influence compliance to physical activity [12,16-18]. However, higher levels of confidence or self-efficacy to overcome exercise related barriers is associated with increased leisure-time physical activity levels [19]. Developing a more comprehensive understanding of the

barriers and benefits associated with exercise and women level of self-efficacy to physical activity may assist in elevating current depressed levels of physical activity in gravid women [20,21].

Thus, this pilot investigation using a semi-structured interview, explored the perceived benefits, barriers and self-efficacy to physical activity in healthy gravid women. The investigation also determined the level of intentional and incidental physical activity using two validated questionnaires [22,23].

Methods

Participants

Twelve nulli- or multi-parous women at various stages of pregnancy who were attending the antenatal clinic Royal Hospital for Women at Randwick, NSW, were randomly recruited by a research midwife for participation in this investigation. The participants had no medical complications and were over the age of 18 years at the time of the interview. Participants had a written informed voluntary consent prior to participation in the investigation. The investigation was approved by the Human Research Ethics Committee of the Royal Hospital for Woman, Randwick Australia.

Study Design

This study was part of a major research project designed to investigate levels of physical-activity predictors in a sample of Australian pregnant women in Sydney. The current study, validity was increased by using leading area topics, which may result in more-reliable information. In addition, many of the themes that came up during the study are identical to themes described in previous studies. This provides more confidence in the reliability of the results.

The pilot investigation used two strategies a semi structured interview including two phases and written survey. Participants had to go through two stages: The first stage, participants have been interviewed with some introductory questions regarding their perception to exercise prior to and during pregnancy. In the second stage, participants asked to complete a self-report written survey questionnaire on physical activity of the pregnancy.

Study Tools

Semi-structured interview

The semi-structured interview design included two phases:

First phase: participants were asked questions regarding their exercise prior to and during pregnancy. The following questions were asked: Q1. Prior to this pregnancy did you engage in any physical activity or sport? Q2. Since becoming pregnant have you made any changes to your exercise habits? Q3. Is there anything that stops you from doing as much exercise as you would like?

Second phase: in the second stage upon completing the survey, the study requested participant's opinion in relation to questions in the survey, barriers and benefits to participating in physical activity during pregnancy. Example of the questions were, Do you feel that the survey was able to record all different types of physical activity you engaged in normally during the day of each week? What would you recommend the researchers to improve the questions?

Questionnaire

A written draft questionnaire modified of the Women's Health Australia Survey and Pregnancy Physical Activity Questionnaire was handed out for completion. The questionnaire modifications were to include barriers to physical activity, self-efficacy and benefits. Physical activity within the survey was evaluated by asking the following question: during this trimester, how much time did you usually spend on physical activities such as walking, running, playing with children, or gardening? Within each question on the survey there were a number of options, a participant make a decision of the option that best fits with her current exercise. Also, while completing the questionnaire, participants asked to circle any questions they found poorly worded or confusing. Barriers and benefits were measured based on two open ended questions developed by Juarbe, *et al.* (2002) [9]. The questions are: (please tell us in your own words; what are the barriers you have encountered in staying physically active or exercising since you becomes pregnant?) And (what are the benefits of being physically active or exercising during pregnancy?). Participants reported the number of times per week and minutes per day of moderate and vigorous leisure time and household activity at three intensity levels: 1- walking quickly, 2- moderate leisure activity, and 3- strong leisure and household activity. In this

section, participants were completed a 5 item self-efficacy scale developed by Marcus, *et al.* (1992) to measure the confidence in ability to exercise. The self-efficacy scale is ranged between not at all confident to extremely confident. Furthermore, the Pregnancy Physical Activity Questionnaire has been found to be valid and reliable self-report measure of physical activity [23]. A key component of the survey was the incorporation of the questions asked in the Active Australia survey. The written form of the Active Australia survey questions has been recently validated [22]. The metabolic measurement scheme (MET-h.wk) applied in the current study was previously developed [23, 24].

All interviews were conducted by a midwifery educator (trained in interviewing techniques and selected to ensure the participants felt comfortable with the interview) in a quiet room within the hospital. Moreover, there were a number of advantages to employ a semi-structured interview as a technique for data collection: to allow participants to express and expand on views to ensure that participant's thoughts to exercise were not partially affected by others as often occurs in focus groups [25,26]. Content analysis was carried out to analyse the qualitative data reached throughout semi-structured interviews.

Data analysis

All audio from the interviews were digitally recorded and were transcribed by a professional independent of the investigation, who also removed any details that could be used to identify a subject. Qualitative thematic analysis of the transcribed notes of the interview was then conducted, with a view to identifying. Key influences on primary information of physical activity experienced during pregnancy. The findings were transferred into NVivo software package, which is used for arranging and analysing qualitative data. Elements were grouped into type of categories to recognise participants' attitudes toward exercise, and the degree to which they engaged in it throughout gestation. Data analysis included analysing transcripts separately, then comparing their identified elements and categories for similarities and dissimilarities prior to the determination of final categories. In addition, qualitative information transcribed from audio recordings of the interviews was coded. Coding was completed by labelling quotes according to themes and categorising the themes into groups. Data was labelled according to the contents and the meaning of the quotes.

Table 1: Demographic characteristics of participants

Characteristics	Sample number (N)	(%)
Age (yrs)		
20-30	1	8.3
31-40	10	83.3
>41	1	8.3
Parity		
Primiparous	4	33.3
Multiparous	8	66.7
Gestation (wks)		
20-30	1	8.3
31-40	7	58.3
41	4	33.3
Highest Qualification		
No formal qualification	0	0
Year 12 or equivalent	1	8
Certificate/Diploma	4	34
University Degree	6	50
Higher University Degree	1	8

Results

Twelve participants aged $34 \pm$, SD 4.6 years, with a gestational age of 38 ± 5.2 weeks (Table 1), volunteered for the investigation. Thus a majority of the participants in the investigation were in their third trimester. Demographic information indicated that most of the study participants (66%) were educated to the tertiary level: approximately half (50%) had university degrees, 8% had higher university degrees and about 34% had a certificate or diploma.

Physical activity prior to and during pregnancy

Participants' responses about exercise were influenced by individual concerns about body changes and individual priorities such as childcare or work. For example, some participants stated, "I've got two kids so I'm just always busy running around after them". Almost 60% (8) of participants reported engaging in exercise prior to pregnancy. About 40% of the participants reduced their physical activity during pregnancy. Furthermore, approximately 33.3% of the pregnant women reported that they did not participate in exercise prior to pregnancy ("I'm not a big exerciser, no").

Participants' physical activity throughout pregnancy was approximately low, and their involvement in exercise was affected by a variety of factors. A number of reasons for limiting participation in physical activity were associated with different time points of pregnancy. About 40% of the participants reduced their physical activity during pregnancy: "Yeah, reduce the activities, not as frequent as before"; "Basically towards the end I just couldn't do any exercise, and I had no energy"; "I'm pregnant, and it's just kind of hard to find appropriate class, I guess, yeah. I just haven't got the time". Furthermore, two participants stopped exercising and about 25% remained inactive throughout the duration of their pregnancy. Two women reported that they hadn't changed their activity during pregnancy: "I was trying to be active with no change in activities". One participant commented on exercise during pregnancy: "Yeah, not as frequent as before. Yeah, well I carried on; I was doing boot camp up till about three and a half months and running up until about five weeks of pregnancy. Since then I've just been generally doing sort of 4K walks with hand weights. Yeah, reduce the activities, not as frequent as before".

The mean total level of physical activities using the Pregnancy Physical Activity Questionnaire was 34.9MET-h.wk⁻¹. Occupational activity was the highest contribution to energy expenditure with 26.7 ± 26.2 MET-h.wk⁻¹, whereas the lowest contribution, exercise, accounted for only 0.7MET-h.wk⁻¹. Par-

ticipants reported light intensity (12.2MET-h.wk⁻¹) as the highest level and a significant source for energy expenditure, while moderate intensity was 8.2MET-h.wk⁻¹. Participating in vigorous energy expenditure was the lowest at 0.5MET-h.wk⁻¹.

Results indicated that pregnant women spent approximately 23% of the total activities each week in household and caregiving activities, with a maximum 2.4 and minimum of 0.0 hours. Mean METs obtained ranged from 39.3 to 0.06MET-h.wk for all daily household activity. The mean total weekly energy expenditure in household activities was 7.5MET-hours/week which reported within the vigorous-intensity range of ≥ 6 METs. Household activities were second most frequently reported, with 23%; exercise was the least-reported activity at 8%. Among the household activities, preparing meals were reported the highest ($1.2 \pm .6$ hrs-wk⁻¹; 39.3MET-h.wk⁻¹), light cleaning such as making beds, doing laundry and ironing ($1 \pm .8$ hrs-wk⁻¹; 20.6MET-h.wk⁻¹) and shopping for food or clothes ($.8 \pm .6$ hrs-wk⁻¹; 17.1MET-h.wk⁻¹), where women spent a total weekly average of approximately 3.0 hours representing 32% of weekly household activities. Mowing the lawn while riding or walking and gardening were the least-performed activities (0.1MET-h.wk⁻¹). Furthermore, study participants reported spending hours on several household activities such as dressing, bathing, feeding and caring for children. Pregnant women were asked about their typical daily activities during this trimester at three point levels (a lot, a little and not at all). The study findings showed 66% (8) of the study sample didn't participate in strength-based activities such as running, lifting or carrying heavy objects or participating in high-intensity exercise. However, identical numbers of subjects reported daily bending and kneeling. Daily climbing of several flights of stairs were reported by 58% of the study participants.

Participants reported a total weekly average of approximate 1.7 hours (SD 1.8) of sedentary behaviour such as using a computer or reading; values ranged from 0.8 to 2.5 hours. Physical inactivity during a typical week and weekend day was reported as an average 2.1h of inactivity on a usual weekend. The average duration of sedentary behaviour of 0.3h during weekdays was almost identical from both the survey and the interviews. Watching TV and sitting while using a computer were the most significant sedentary activities, comprising 45% of the total inactivity. Women spent a weekly average of 0.8h driving or riding a car or a bus; reading, talking or using the phone comprised 19% of total inactivity. Table 2 shows the mean (SD) and 25th and 75th percentiles for women's self-reported type and intensity of physical activity in (MET-h-wk) reported by the Pregnancy Physical Activity Questionnaire (PPAQ). Furthermore, the study outcomes showed a maximum 2.5 hours of work activity, with a weekly mean of 1.8 (SD 2.4), representing 25% of activity in all domains. Standing or walking slowly at work while not carrying anything and sitting at work or in class were the most significant work-associated activity, with a daily average of 2.5 hours; four subjects reported the highest amount, 12 hours, which accounted for 20% of the total work activity.

The lowest level of exercise, reported by approximately 8% of participants, was an average 0.6 hours of brisk walking while carrying heavy loads related to work activity. Participants reported a maximum exercise of 0.5 hours with a weekly hour mean of (0.2 ± 0.3 hrs-wk⁻¹; .7MET-h.wk⁻¹). Walking either slowly or quickly was the most preferred activity for fun and exercise, accounting for 46% of time spent in such activities. In addition, participants showed a total average of ($0.4 \pm .5$ hrs-wk⁻¹; 1.2 MET-h.wk⁻¹) in walking quickly, and an average of ($0.5 \pm .5$ hrs-wk⁻¹; 1.5MET-h.wk⁻¹) of daily-bases walking slowly. They spent the least time in such activities as swimming and dancing, with an average of ($.1 \pm .2$ hrs-wk⁻¹; .3MET-h.wk⁻¹). Participants reported spending 15% of their time in a variety of common daily tasks.

Table 2: Values for the mean (SD) and 25th and 75th percentiles in MET-h.wk for the Pregnancy Physical Activity Questionnaire (PPAQ) by total energy expenditure and intensity during pregnancy

	Mean (MET-h.wk ⁻¹)	SD	25 th Percentile	Median	75 th Percentile
Type of activity					
Household	7.5	5.8	2.9	6.2	11.1
Exercise	0.7	0.5	0.4	0.6	1.1
Occupational	26.7	26.2	0.3	21	53.3
Sedentary behaviour	30.5	19.1	15.5	26.8	51.7
Activity intensity					
Light	12.2	7.8	4.4	10.8	17.6
Moderate	8.2	7.3	1.5	7.1	16.1
Vigorous	0.5	0.7	0.0	0.2	0.8

Based on data from the Australia Active Survey, the mean total level of physical activity was (27.9MET-h.wk⁻¹). Table 3 shows the mean (SD) for women's self-reported physical activity in (MET-h.wk) using the Active Australia Survey. The highest mean METs levels of physical activity for the week prior to the survey were reported for strong household activity (11.7MET-h.wk⁻¹), and the lowest for strong leisure-time activity (2.3MET-h.wk⁻¹). Participants reported moderate exercise and leisure-time activities such as jogging or exercise for fun and recreational swimming or dancing reported at an average of 0.4 ± 1.2 sessions.wk⁻¹, 0.7 ± 2.3 hrs.wk⁻¹; 2.5MET-h.wk⁻¹; these activities fell within the light intensity range from < 3 METs. Strong leisure-time activities such as aerobics and running were further reported at a light MET intensity, with a mean of 0.3

± 1.2 sessions.wk⁻¹; 0.5 ± 1.7 hrs.wk⁻¹, 2.3MET-h.wk⁻¹, constitutes around 8% to total weekly activity. Time spent in physical activity differed across the seven days of the week prior to the survey; evaluation of survey responses focused on strong household and leisure-time activities. The mean MET for strong household activity was 11.7MET-h/week, accumulating (1.2 ± 2.3 sessions.wk⁻¹; 1.7 ± 2.9 hrs.wk⁻¹), which is categorised as vigorous-intensity (≥ 6 METs). Participants indicated approximately 44% in strong household or gardening tasks of the weeks' reported activity. Participants indicated a mean of 11.5MET-h.wk, accumulating 2.7 ± 2.7 sessions.wk⁻¹; 2.4 ± 2.9 hrs.wk⁻¹ of walking quickly for recreation or going to places, which accounted for 37% of the total activity.

Table 3: Mean SD self-reported physical activity values during pregnancy in (MET-h.wk) using the Australia Active Survey (AAS)

Activity	Mean (MET-h.wk ⁻¹)	SD
Walking quickly	11.5	14.8
Moderate leisure time	2.5	8.05
Strong leisure time	2.3	7.8
Strong household	11.7	24.7
Total activity	27.9	46.5

MET hours per week (MET-h.wk); total MET-h.wk is the sum of total h/wk multiplied by established MET value [48, 59] of the reported type of physical activity.

Preferred activities

More than half of the respondents stated that their most preferred activity was walking. The majority of women (74.7%) reported walking as their preferred activity prior to and during pregnancy. The next most popular activity was yoga, preferred by approximately 33.3% of participants. Participants stated, "Just simple walking, light aerobics"; "It's really just yoga and I go swimming but it's more recreational, not so much laps, and jogging and walking." Swimming was one of the most accepted exercise options, proposed by approximately 25% of participants. Participants also reported other preferred activities such as jogging and boot camping.

Barriers

Participants were influenced by individual concerns about body changes and individual priorities such as children or work. Many reported personal difficulties in engaging in physical activity throughout gestation. Five participants (41.6%) reported growing body size as the major barrier to exercise in pregnancy, and most participants referred to their growing belly. In addition, participants perceived that increased body size hindered their capability to walk around. Some of the study sample (66.6%) indicated that tiredness and discomfort were the most frequent barriers to exercise during pregnancy. They also identified other barriers to exercise, such as frustration, pain and lack of time: "Tiredness, well it's just really like almost the inability to do it, like it's a bit frustrating"; "So I guess its pain, it gets really painful". In addition, four women (33%) were inactive mainly because they were busy and didn't have enough time.

Some pregnant women pointed out that work outside the house and additional associated responsibilities were barriers to exercise. Participants also noted the burdens of time management in trying to incorporate regular exercise into their week. For example, participants commented, "Just finding the time, that's probably hard just like balancing, like, you know, family life and work and exercise time"; "I work long, long hours. I run my own business so I've also got a very, sort of, very high stress kind of situation going on where I probably that's probably exercise too, to be honest." Other participants indicated that it is hard to be active mainly as pregnancy progresses. Participants recognised some other barriers such as having children, lack of information and classes for pregnant women and working for long hours. Table 4 summarises participants' comments about barriers to physical activity during pregnancy.

One woman commented how, in the early stages of pregnancy, "I underestimated how tired I would be and how sick I'd feel. Because of the nausea the last thing you want to do is exercise." Other physical discomforts were exacerbated by activity during pregnancy; for example, participants experienced breast tenderness, sore knees, pressure from the uterus, breathlessness and backache. One woman at 37 weeks' gestation described how her body had become quite cumbersome "Walking around it feels like I'm carrying a Mack truck." During the course of the pregnancy, women also identified other barriers to participation, including time, access, having a child or children to look after, working and decreased motivation: "The down times I have are about comfort rather than getting out of my comfort zone, and that is a real worry because I want to live a healthy life."

Table 4: Summary of participants' main barriers to not being physically active during pregnancy

Barrier	Quotes from Participants
Lack of time	"Just finding the time" "Time-poor"
Lack of energy	"That's probably exercise too to be honest energy levels" "Tired mostly"
Tiredness	"Being pregnant makes me very tired" "Tired mostly"
Discomfort or pain	"I feel uncomfortable" "It's really uncomfortable and painful" "Uncomfortable and painful" "It gets really painful"
Exercise classes	"Well, there are not many classes for pregnant women" "Sometimes it's not in your area"

Benefits

Participants documented a variety of possible benefits of engaging in physical activity prior to and during pregnancy. They associated these benefits with both physical and mental health for their pregnancy and delivery period. The most commonly cited benefit was feeling better, both mentally and physically (41.6%). Exercise may help participants feel better about themselves, and may elevate mood, stabilise emotions and help women feel physically and mentally better. Some participants mentioned such advantages: "I just felt mentally better"; "Oh, definitely, yeah. You feel, your moods are more stable." Many participants expressed the belief that participating in physical activity during pregnancy could assist in weight control. In addition, two women reported that feeling better could be a factor in managing pregnancy weight: "Well, for me, being so active before pregnancy and staying active, it meant my weight gain was limited to just pretty much baby weight"; "Like for me it was, you know, just trying to be healthy and not putting on too much weight." Participants also believed that exercise reduces labour difficulties and pregnancy-associated complications, and increases energy levels, which helps in performing daily tasks. Overall, physical activity in pregnancy was considered to contribute to a healthy pregnancy: "help women stay in shape"; "feel better and helps in keeping fit"; "you do exercise, you feel quite energised"; "makes a big difference". Participants felt that being physically active during pregnancy would ease birth complications and could assist pregnant women in performing their home duties.

Although less frequently, participants also recorded benefits such as improving blood circulation, better ability to perform of daily tasks and help with labour: "It's always supposed to help with the labour and the birth and everything"; "You feel happy, you feel you can do every day work at home with the baby"; "It makes a big difference, it makes you feel fresh, like it's a huge advantage." Participants indicated perceived benefits associated with enhanced correlated responsibilities. By being active, pregnant women could maintain or increase their daily activity as mothers and family members: "I've probably had a lot more energy because I've been exercising."

Discussion

Although exercise for pregnant women is an important health behaviour, level of participation in exercise is still low. Thus, there is a significant need to investigate factors that affect Australian pregnant women's exercise involvement. From the

perception of the study participants, the main concerns are not the perceived benefits of exercise, other than the complicated effort connected to the barriers that they experienced. Overall, the study participants described a range of exercise during pregnancy, and their level of exercise was greater prior to pregnancy than throughout pregnancy.

Benefits of physical activity

The study findings reviewed information on exercise before and during pregnancy and the perceived barriers to and benefits of participating in physical activity during pregnancy. Pregnant women indicated several benefits from being active. The study findings demonstrated that these participants recognised the physical and mental health benefits, such as feeling better, good mood, weight control and reduced likelihood of birth difficulties. These benefits are similar to those cited by women in other studies [4, 7, 9, 10, 27, 28]. Furthermore, the level and duration of physical activity during pregnancy was consistent with those found in other studies [29,30]: participants reduced their physical activity as pregnancy advanced. Some of participants in the current study (25%) didn't engage in physical activity for reasons such as lack of time; however, all women agreed on the benefits of exercise during pregnancy.

Participants felt that being physically active during pregnancy would ease birth difficulties associated complications, and would help them perform their home duties, as well as help them feel better about themselves. Furthermore, they felt that exercise would probably increase energy levels, which would in turn help them perform daily tasks. Overall, physical activity in pregnancy was considered to contribute to a healthy pregnancy: "help women stay in shape"; "feel better and helps in keeping fit"; "when you do exercise, you feel quite energised"; "makes a big difference". Comparable benefits were found in other studies, such as physical activity during pregnancy is safe for both mother and foetus. It improves birth, reduces complications associated with birth and increases energy [28, 11, 31].

Barriers

In the present study pregnant women found that tiredness and discomfort, growing body size and lack of time were the most significant barriers to exercise. Barriers illustrated in the current study are comparable to those identified in other studies [32, 33]. Many of the barriers seemed to be external and out of the women's control; this suggests that support has to be given to pregnant women to change behaviour and conquer such barriers.

ers. This study adds to the relatively sparse literature evaluating the relative importance of barriers among Australian pregnant women.

One option to help mitigate these barriers may be to provide information such as booklets in maternal clinics and hospitals on the benefits of exercise in pregnancy. Regular, practical exercise classes for pregnant women might be another approach. The study demonstrated that lack of interest in exercise was a significant cause of failure to participate in exercise, with 25% of respondents reporting no exercise, and approximately 58% reporting some types of physical activity. This level of exercise participation during pregnancy is similar to what has been found in other studies [34, 35]. This may be due to the fact that most of the women in this study were involved in non-planned programs, which are more flexible and less costly than designed exercise programs.

Most participants also reported that growing body size was a barrier to exercise. Similarly, preceding studies [36, 19, 37] have identified physical limitations and restrictions due to pregnancy as significant barriers to exercise. Many of the barriers identified in the current study were comparable to those found in previous studies, including household responsibilities, lack of time, tiredness and lack of energy [32,38].

Preferred Activity

Results of the current study demonstrated that walking was commonly seen as safe and useful for pregnant women for improving both physical and emotional health. Identical to the present study's findings, previous studies [38-41], have indicated that walking was the preferred activity among participants. The study outcomes showed that swimming, jogging and boot camping were among other activities preferred pregnant women. These findings are inconsistent with results in earlier studies [39, 42-45] where activities such as swimming and camping were among the most favoured. Walking is acceptable and practical; it can be easily performed as a daily exercise. Therefore, walking appears to be an appropriate activity for interventions during and subsequent to pregnancy.

Changes in Physical Activity

General reductions were observed in levels of physical activity during pregnancy, which carried on as pregnancy progressed. Self-reported total exercise decreased, on average by

almost 56% during pregnancy, and stayed below the level prior to pregnancy. The exception was time spent walking, as walking during pregnancy was comparable to that described for the pre-pregnancy stage. The overall reduction in level of exercise during pregnancy was almost 40%. Furthermore, inadequately active daily lifestyle overall increased by 70% during pregnancy. These declines in exercise level are of particular concern because they were related to increased physical limitations during pregnancy. Such difficulties reported subsequent to labour may lead to long periods of weight retention, as well as risk for diabetes and cardiovascular disease. Studies [46,47] cited even larger declines in physical activity level for pregnant women, suggesting that reducing exercise level in reaction to the first pregnancy may be of particular concern. Other studies have found, consistent with the present study that the decline may continue to the post-partum stage and beyond. In the current study, the reduction in exercise from pre-pregnancy to pregnancy was followed by increases in walking, on average; the women appeared to be walking as much as they had prior to pregnancy [48,49].

Conclusion

In conclusion, decreases in physical activity level during pregnancy may anticipate a potential risk of diseases such as obesity and gestational diabetes. A number of factors associated with time devoted to exercise predicted the possibility of deficient activity, including lack of time and number of children. The challenge highlighted by the current study's results is to create strategies to help Australian pregnant women maintain overall physical activity levels even when they are faced with these and other barriers during pregnancy.

The study participants emphasised not having sufficient supporting information about exercise in pregnancy. Participants also lacked practically located exercise classes specifically for pregnant women. These opinions and experiences should be taken into account when designing research to investigate physical activity during pregnancy.

The study outcomes are subject to certain limitations; specifically, the sample size was small, and the participants were mostly well educated. As a result, the findings may not be generalizable. Implementation of strategies such as educational exercise classes that aim to increase level of participation in physical activity during pregnancy is therefore recommended. During maternal visits, professionals should provide clear direction for parental physical activity.

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