Diagnosis to Delivery: A randomised clinical trial of Postmeal Walking as a Non-Pharmacological Treatment of Gestational Diabetes

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Abstract

Objective The aim of this study was to determine whether postmeal walking is an effective and feasible alternate to standard-care advice of 30-min continuous walking for the management of gestational diabetes (GDM). Design, Setting Randomised controlled trial conducted in Australia. Sample, Methods Forty women with GDM were randomised between 28-30 weeks' gestation into either standard-care (CTL; 30-min continuous walking) or standard care with advice for PMW (10-min walking after main meals). ActivPAL inclinometers and continuous glucose monitors (CGM) were worn from 28 weeks to 35 weeks. Birth outcomes were also collected. A linear mixed model analysed the changes from baseline (28 week) through to 35 weeks' gestation between continuous and postmeal walking. Main Outcome Measure Postprandial glucose. Results Twenty-six women (PMW: n=12, CTL: n=14; 35 ? 5 y) completed the intervention. 3 h postprandial glucose at lunch and dinner, were ˜0.25 and ˜0.35 mmol/L, respectively higher in PMW vs. CTL (group: p = 0.04). 24 h, nocturnal and fasting glucose were similar. PMW spent ˜57 min/d more in sitting time and ˜11 min/d less stepping time vs. CTL (group: p= 0.02 and 0.05). Both PMW and CTL had high adherence to exercise prescriptions, physical activity decreased with gestation. No difference in birth outcomes. Conclusions Postmeal walking was less effective than the standard care physical activity guidelines of thirty minutes continuous walking. More research on the optimal duration and intensity of postmeal walks to improve postprandial responses are needed. Strategies that mitigate sedentary time in pregnancy are also warranted.

Title:

Diagnosis to Delivery: A randomised clinical trial of Postmeal Walking as a Non-Pharmacological Treatment of Gestational Diabetes

Running Title: PMW in GDM (<47 characters)

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Tweet: Continuous walking was superior to prescribing 10-min of walking after main meals in women with gestational diabetes #PostmealWalking #GestationalDiabetes #Pregnancy

Objective

The aim of this study was to determine whether postmeal walking is an effective and feasible alternate to standard-care advice of 30-min continuous walking for the management of gestational diabetes (GDM).

Design, Setting

Randomised controlled trial conducted in Australia.

Sample, Methods

Forty women with GDM were randomised between 28-30 weeks' gestation into either standard-care (CTL; 30-min continuous walking) or standard care with advice for PMW (10-min walking after main meals). ActivPAL inclinometers and continuous glucose monitors (CGM) were worn from 28 weeks to 35 weeks. Birth outcomes were also collected. A linear mixed model analysed the changes from baseline (28 week) through to 35 weeks' gestation between continuous and postmeal walking.

Main Outcome Measure

Postprandial glucose.

Results

Twenty-six women (PMW: n=12, CTL: n=14; 35 $\pm$ 5 y) completed the intervention. 3 h postprandial glucose at lunch and dinner, were ~0.25 and ~0.35 mmol/L, respectively higher in PMW vs. CTL (group: p = 0.04). 24 h, nocturnal and fasting glucose were similar. PMW spent ~57 min/d more in sitting time and ~11 min/d less stepping time vs. CTL (group: p= 0.02 and 0.05). Both PMW and CTL had high adherence to exercise prescriptions, physical activity decreased with gestation. No difference in birth outcomes.

Conclusions

Postmeal walking was less effective than the standard care physical activity guidelines of thirty minutes continuous walking. More research on the optimal duration and intensity of postmeal walks to improve postprandial responses are needed. Strategies that mitigate sedentary time in pregnancy are also warranted.

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Keywords: Gestational Diabetes, Glucose, Physical Activity, Pregnancy, Walking

Abbreviations: CGM: Continuous Glucose Monitor; CONSORT: Consolidated Standards of Reporting Trials; CTL: Standard-care only: GDM: Gestational Diabetes; iAUC: Incremental Area Under the Curve; ISLHD: Illawarra Shoalhaven Local Health District; MAG: Mean Absolute Glucose; MNT: Medical Nutrition Therapy; PMW: Postmeal Walking; SMBG: Self-Monitoring Blood Glucose.

INTRODUCTION

Gestational diabetes mellitus (GDM) is the most common pregnancy complication which impacts at least 14% of pregnancies globally [1–3]. GDM is a form of diabetes that occurs in pregnancy and although usually subsides following delivery it can have lasting implications for mother and child [4, 5]. GDM is associated with an increased risk of pregnancy complications such as macrosomia, caesarean sections, and a higher risk of developing type 2 diabetes and cardiovascular disease in the future compared to women with pregnancies without GDM [6–8]. Given the increased risk for complications such as macrosomia with increasing postprandial glucose concentrations [9], therapies that aim to specifically address postprandial hyperglycaemic excursions could play a vital role in the frontline treatment of GDM.

Postmeal walking, or walking after three main meals, has been proposed as a potential strategy to target postprandial hyperglycaemia in populations with diabetes [10–15]. Postmeal walking has been shown to reduce hyperglycaemia in people with type 2 diabetes and women at risk of GDM [12, 13, 16, 17], however the available research on women with GDM have presented varied responses [10, 11, 18]. Here, one bout of postprandial walking [18] or three bouts of postmeal walking [10] lowers postprandial glucose compared to sitting. Whereas, compared to usual care (i.e., not sitting, in a free-living non laboratory environments) three 10-min postmeal bouts were similar to 30-min of continuous walking for glycaemic control [11]. Given the need for more therapeutic options that are translatable and effective for the management of GDM a longer-term intervention from diagnosis to delivery, in a free-living environment, that compares postmeal walking against the current standard care from diagnosis through to delivery is warranted.

During pregnancy, women are recommended to perform at least 150 minutes of moderate physical activity per week [19], however, only one in six women meet these recommendations [20]. Barriers to physical activity include lack of motivation, tiredness, pregnancy-related symptoms, and a lack of education regarding the guidelines [21]. Breaking up activity into shorter bouts is one strategy to reduce barriers of fatigue and lack of time. In addition, accumulating activity in three short bouts has shown similar health benefits for fitness, blood pressure, lipids, insulin and glucose, to one continuous bout in a systematic review and meta-analysis of 19 studies involving over 1000 community dwelling adults [22]. Therefore, a strategy to encourage women to overcome barriers to physical activity is necessary to ensure women with GDM are able to reach their standard-care guidelines.

In a randomised controlled trial, we examined the effect of a 7-week intervention of three daily 10-minute bouts of postprandial walking compared to standard-care guidelines on postprandial hyperglycaemia, fasting blood glucose, mean 24-h blood glucose, physical activity, and sedentary time. It was hypothesised that 10 minutes of postprandial walking three times daily would improve postprandial hyperglycaemia, fasting blood glucose, mean 24-h blood glucose, physical activity, and sedentary time in women with GDM compared to control standard guidelines which include recommendations to perform 30 minutes of continuous physical activity on most days.

MATERIALS AND METHODS

Study Design: A randomised control trial was carried out in the Illawarra Shoalhaven Local Health District (ISLHD) and greater Sydney area, NSW, Australia from September 2018 to March 2022. Study recruitment and data collection were paused from March 2020 to October 2021 due to the coronavirus pandemic restrictions. A Consolidated Standards of Reporting Trials (CONSORT) flow diagram indicating recruitment and enrolment during these periods is provided as Figure 1. Women were randomised 1:1, via a third-party computer generator, to standard-care which includes advice to perform 30 minutes of physical activity daily (Control (CTL)) or standard-care with intervention advice to perform three 10-min bouts of postmeal walking (PMW: 30 minutes broken up into 10 min walking, within 60 minutes of breakfast, lunch, and dinner) (Figure 1). To understand the real-world impact and future translation, the intervention for this pragmatic pilot trial was delivered alongside standard-care and undertaken in free-living habitual conditions with minimal contact by researchers. Concurrently, using continuous glucose monitors (CGM) and inclinometers for physical activity, we were able to assess the glycaemic impact and adherence to our physical activity prescriptions in the free-living environment. This study was approved by the joint University of Wollongong and ISLHD ethics committee (HREC: 2018/318; ACTRN12618001355268) with written informed consent provided by all women at the first meeting with researchers.

Participants: Women with GDM were recruited via social media callouts (in the greater Sydney area) and group education sessions at the Illawarra Shoalhaven Local Health District Diabetes Service. Participants were eligible for this study with a diagnosis of GDM according to the International Association of Diabetes in Pregnancy Study Group criteria [4], were aged > 18 years, and were <30 weeks' gestation. Exclusion criteria included <18 years, high-risk pregnancies, women with prescriptions for metformin or corticosteroids, contraindications to performing physical activity, or women on pre-existing medications for conditions such as hypertension, cardiac disease, renal disease, thyroid disease, or psychosis.

Interventions:

Standard Care (CTL): All eligible women received standard education from dietitians and diabetes nurse educators at their local health districts Diabetes Service; education included Medical Nutrition Therapy (MNT [23]), physical activity and self-monitoring blood glucose (SMBG; fasting and either one- or two-hour post meal finger pricks). Physical activity education included recommendations to meet the physical activity guidelines of 150 minutes moderate intensity physical activity per week or thirty minutes of physical activity on most if not all days (performed any time during the day [19]).

Postmeal walking (PMW): All women received standard-care as above, however women in the PMW intervention were specifically instructed by researchers to distribute their 30 minutes daily physical activity as 10 min walks (at an intensity using Borg Rating of Perceived Exertion Scale: 11 – 13), within 60 minutes of consuming breakfast, lunch, and dinner, for the rest of their pregnancy.

[Figure 1]

Outcome measures:

CGM derived indicators of glycaemic control

A CGM (iPro2, Medtronic) was worn to continuously measure interstitial glucose concentrations across 7 days at 28- and 35-weeks gestation (Sept 2018 to July 2020; n= 57) and Freestyle Libre, Abbott (January 2022 to March 2022; n= 3) for 7 days at 28-30-, and 35-37 weeks' gestation. The CGM was inserted into the subcutaneous layer on the posterior 1/3 of the upper limb. As per standard-care SMBG and calibration for iPro CGMs, women recorded capillary glucose concentrations four times daily and entered into the CareLink Pro App (discontinued) or provided a hard copy to researchers. Glycaemic variability [Mean Absolute Glucose (MAG) and SD] was analysed using the EasyGV spreadsheet (Oxford University, UK). Mean nocturnal glucose was calculated from 00:00 – 05:00 and 3 h postprandial glucose was calculated from main meal times. Incremental area under the curve (iAUC) was calculated using the trapezoid method.

Physical activity and adherence

Participants wore an ActivPAL3 inclinometer (PAL Technologies Ltd, Glasgow, Scotland) to objectively measure adherence, physical activity and sedentary behaviour for 7-days at 28-, 32- and 35-weeks gestation. The ActivPal was worn on the anterior, proximal 1/3 of the lower limb and secured with a Tagaderm. Physical activity and sedentary time were calculated through changes in posture and movement in three planes; sitting, standing, and stepping. Data with < 10h of valid data were excluded from analysis [24]. Using the PAL software suite (PAL Technologies Ltd) files were exported to calculate the following measures: 1. Total minutes of prolonged periods (>30 minutes) of sitting time; 2. Total daily time sitting (minutes); 3. Total daily standing time (minutes); 4. Total daily stepping time (cadence >20 steps.minute^{-1}) (minutes); 5. Estimated energy expenditure/exercise intensity as metabolic equivalent (MET.h^{-1}). Adherence to intervention physical activity recommendations was calculated using exported 15-s epochs to identify the longest stepping bout within 60 minutes of consuming each main meal (PMW) or the longest daily stepping bout (CTL). Times for exercise were also reported.

Birth Outcomes

Women were asked to report the birth outcomes following their delivery. Outcomes included mode of delivery (vaginal/caesarean), mode of labour (spontaneous/induction), gestation at delivery (weeks), incidences of neonatal hypoglycaemia (n), neonatal birth weight (kg), length (cm), head circumference (cm) and sex (male/female).

Statistical Analysis:

This pilot study included analyses on women who were diagnosed with GDM and began the intervention between 28-30 wk gestation. Statistical analyses were completed using a fixed effects Linear Mixed Model to compare changes in glucose and physical activity from Baseline (28-30 weeks) through to ~35 weeks between groups (Group, Time, Interaction). T-tests and Chi square analysis were used to compare differences between baseline demographics and birth outcomes. Data matched for pre-pregnancy BMI is also presented. Pearson correlation analysis was performed between postprandial and physical activity outcomes against birth weights to assess whether there was a relationship between physical activity or glucose and neonatal birth weight. Data are expressed as means or frequency.

RESULTS

Participant characteristics

177 women registered interest in the study by completing an expression of interest contact form, however, 105 declined to participate, 27 did not meet inclusion criteria, and 5 selected other as the reason for not participating. A total of 40 women were eligible and enrolled in the study a (20 randomised to each study arm). 12 women (60%) in the PMW arm and 14 women (70%) in the CTL arm completed the intervention. Reasons for dropping out during the intervention included, declined to participate (n=10), medical conditions (n=2), beginning metformin (n=2), COVID-19 lockdown (n=1). A Consort diagram of participant recruitment and randomisation is presented in Supplementary Figure 1.

There were no differences between groups for age (CTL: 34 ± 4 y; PMW: 33 ± 5 y), height (CTL: 1.7 ± 0.2 m; PMW: 1.6 ± 0.1 m), pre-pregnancy weight (CTL: 72.3 ± 16.9 kg; PMW: 81.2 ± 20.0 kg), pregnancy weight (at time of enrolment) (CTL: 80.5 ± 17.4 kg; 87.9 ± 20.8 kg), pregnancy BMI (at ~28 wks) (CTL: 38.7 ± 5.4 kg.m^{-2}; PMW 32.8 ± 6.0 kg.m^{-2}), and Godin physical activity score (38.7 ± 23.8 a.u.; PMW: 32.8 ± 6.0 a.u.). Pre-pregnancy BMI (but not pregnancy BMI) was significantly higher in PMW (CTL: 25.74 ± 5.12 kg.m^{-2}, PMW: 30.23 ± 6.21 kg.m^{-2}; p = 0.046), and gravida was significantly higher in CTL (CTL: 2.18 ± 0.88 children, PMW: 1.46 ± 0.66 children; p = 0.021).

When groups were matched for pre-pregnancy BMI (CTL n=19: 26.3 ± 4.8 kg.m^{-2}, PMW n=19: 29.2 ± 5.2 kg.m^{-2}; p = 0.156), there were no differences in baseline characteristics between groups (as above).

CGM derived indices of glycaemic control

Postprandial 3 h mean glucose following dinner was significantly higher in the PMW group compared to CTL (group: p = 0.04), however, there was no significant difference across groups or time for 3 h postprandial breakfast or lunch glucose (interaction: p = 0.69 and 0.97, respectively). There was a trend towards a higher 24 h iAUC in PMW compared to CTL (time: p = 0.06, Figure 2). Fasting finger pricks, nocturnal and 24 h mean glucose, MAG, and SD were not different between groups across time (Table 1).

When matched for pre-pregnancy BMI, postprandial 3 h mean for lunch and dinner were significantly higher in the PMW group compared to CTL (group: p = 0.04 and 0.01, respectively), however, there was no significant difference at breakfast (interaction: p = 0.64).

Physical activity patterns

There were no differences in groups over baseline days (Table 1). Sitting time during the intervention was 66.0 ± 137.1 min.day^{-1} higher for the PMW group compared to CTL (group: p = 0.02, Figure 2), however, time spent sitting in periods for more than 30 minutes at a time did not differ between groups over time (interaction: $p = 0.50$). Stepping time during the intervention was lower with PMW compared to CTL (by 14 min.day^{-1}; group: $p = 0.05$, Figure 2). Mean time spent standing and activity score did not differ between groups over time (Table 1).

When groups were matched for pre-pregnancy BMI, outcomes were the same (as above).

Adherence to physical activity prescriptions between groups

There was no difference between adherence to the physical activity recommendations between groups (overall average: PMW: 29.6 ± 12.7 minutes; CTL: 29.9 ± 12.4, interaction: $p = 0.12$, Figure 2). In the PMW group, adherence to 10 minutes of PMW after breakfast decreased significantly by 35 weeks (28 weeks: 10.0 ± 6.1 minutes, 32 weeks: 14.7 ± 10.9 minutes, 35 weeks: 5.3 ± 3.2 minutes; time: $p = 0.04$). Following dinner (28 weeks: 7.6 ± 4.3 minutes, 32 weeks: 12.2 ± 3.3 minutes, 35 weeks: 7.5 ± 2.9 minutes; time: $p = 0.02$). Interestingly, there were no differences in the intensity of physical activity (estimated using cadence) between groups or across time (Table 1).

When groups were matched for pre-pregnancy BMI, outcomes were the same (as above).

When looking at timing of walking, for the 30-min continuous bouts of walking (CTL group), 25% of sessions were done in the morning (6am – 11am), 42% were done in the mid-afternoon (11am – 4pm), and 33% were completed in the evening (4pm – 10pm). 18% (n = 23) of postmeal walking bouts began 0 – 15 minutes after finishing their meal, 23% (n = 30) began 15 – 30 minutes, 37% (n = 47) began 30 – 45 minutes, and 22% (n = 28) began 45 – 60 minutes after finishing their main meal.

[Figure 2]

Birth Outcomes

There were no differences between groups for labour onset, type of birth, estimated gestation at birth, birth weight, birth length, head circumference, sex, or incidence of hypoglycaemia ($p > 0.05$; Table 4). Only 4.5% (CTL: n = 1) neonates presented any incidence of hypoglycaemia, and only 13.6% (CTL: n = 2; PMW: n = 1) neonates met diagnostic criteria for macrosomia (birth weight > 4000g).

When matched for BMI, no differences were seen between groups for all birth outcomes.

Relationship between glycaemic and physical activity and birthweight

There was a significant positive relationship between 3 h postprandial blood glucose (at 35 weeks) and birth weight ($r = 0.48$; $p = 0.05$). There was a significant moderate, positive correlation between standing time (at 35 weeks) and birth weight ($r = 0.51$; $p = 0.02$). There was also a significant, moderate negative correlation between sitting bouts > 30 min (at 35 weeks) and birth weight ($r = -0.53$; $p = 0.02$). There was no significant relationship between 28-week postprandial glucose, stepping time, sitting time, standing time, or sitting bouts > 30 min and birth weight.

DISCUSSION

This randomised clinical trial examined the effects of postmeal walking (PMW; 10-minute walks after three main meals) on measures of maternal glucose control and physical activity patterns compared to current standard-care physical activity recommendations in women with GDM. In contrast to our hypothesis, PMW was neither superior nor comparable to standard-care advice to walk/be physically active for ~30-minutes per day for both glycaemic and physical activity outcomes. Prior research had compared postmeal walking to a sitting control in acute settings [18], this is the first trial to compare a PMW intervention and include an active comparator; reiterating advice that is also standard care. Though both groups on average met the minimum physical activity recommendations, adherence to 10-min bouts after meals in the PMW group decreased to nearly half the recommended amount by 35 weeks and the PMW group spent more time in sedentary behaviours and less time in incidental activity across the intervention. This was unexpected as we had hypothesised that dividing 30-min into smaller bouts may be more achievable and by spreading them across the day this would reduce sitting time. The tendency for more sedentary behaviour and lower incidental activity for the PMW group was evident at baseline but also persisted throughout the intervention. This increase in sedentary behaviours likely counteracted the benefits of a 10-min walk and may explain the lack of results for many of the glucose outcomes.

Controlling maternal glucose concentrations are pivotal for the future health of both the women and children diagnosed with, or born to, a GDM pregnancy. Whilst our study found no differences in 24 h or nocturnal (fasting) glucose, there were effects on postprandial glucose. BMI-matched PMW group had a higher postprandial glucose over lunch and dinner compared to CTL, this was unexpected given PMW bouts were prescribed to reduce postprandial glucose after meals via contraction mediated uptake. These results may be due to 42% of the CTL group completing ~30-min walks at lunch (supplementary Figure 2); the exercise duration being three-fold longer than that recommended to PMW. Further, within the PMW there was a lower adherence to 10-min walks after dinner which may further explain the worsening postprandial mean and AUC across the afternoon/evening. In addition to the finding regarding adherence, the superior results with 30-min continuous suggests longer postmeal walks, or potentially higher intensity postmeal walks (intensity was recorded to be largely light intensity/pace of walking), are needed to influence postprandial glucose in women with GDM.

Given the well-known poor adherence to physical activity during pregnancy [20], strategies that make physical activity in pregnancy more palatable and achievable are urgently needed. Our study showed high adherence to achieving 30-min of daily walking, regardless of whether prescribed as accumulated bouts or one single bout. This may be due to selection bias of recruitment into an exercise-based study for women with GDM, both groups were considered physically active at baseline. We found that the small goal of 10 minutes of walking after main meals is achievable across the day, women exceeded the physical activity recommendations at 32 weeks and although this dropped off significantly at 35 weeks this was a similar trend in both groups. The high physical activity in both groups may also be a key factor in the normal birth outcomes reported for this sample. Future research would benefit from exploring utilising PMW to improve adherence to physical activity guidelines in less physically active women.

GDM is associated with an increased risk of many neonatal conditions such as hypoglycaemia, caused by hyperinsulinism, and macrosomia. It is reported that 53% of diet-controlled GDM neonates present incidences of hypoglycaemia [25], however, our study reported only one (4.5%) neonate with any hypoglycaemia excursions (n=1 CTL). Further, 15-45% of women with GDM deliver babies with macrosomia ($>$ 4000 g birth weight) [26], yet only 3 (13.6%) neonates presented at this threshold in this study (n=2 CONT, n=1 PMW). Interestingly, increased standing time, and decreased sitting bouts $>$ 30 minutes correlated to a larger neonatal birth weight. Our study agrees with previous literature (25, 26) that increased neonatal birth weight was correlated with an increased postprandial glucose. Whilst many studies [6, 25, 26] have explored the relationship between maternal glucose and neonatal outcomes, they did not control for diet or physical activity. The findings of this study suggest controlling maternal glycaemia and reaching physical activity guidelines are both beneficial in improving the birth outcomes of pregnancies with GDM, future research is needed into the effect of specific physical activity patterns.

This is the first study to explore postmeal walking in free-living women with GDM from their initial diagnosis to delivery. In contrast to previous research, interventions were time matched to the current standard care physical activity guidelines (3 x 10 minutes vs 30 minutes continuous)[10, 18]. The proposed intervention of PMW is scalable and simple to deliver, however our findings indicate further research on mitigating sedentary behaviour and increasing steps per day in pregnancy, in addition to prescribing physical activity, is warranted. A major strength of this study is the use of a continuous measurement period of glucose responses, after meals and overnight, in response to interventions. This is important given the emphasis on tight glycaemic ranges for GDM management of fasting and postprandial. Similarly, another strength of this study is the use of an inclinometer for objective physical activity and adherence measurement. This is important given its ability to provide an objective measure of physical activity and provide exact times exercise began and finished, exercise intensity and duration of bouts; all of which can inform future research. There are also several limitations to acknowledge. We finished up with a smaller sample size with a higher than anticipated number of dropouts in the study, largely experienced due to the COVID-19 pandemic. Previous research recommended at least 12 participants per group for pilot studies may be valid in providing sufficient data to further inform larger trials [27].

Conclusion

This study is the first of its kind to explore postmeal walking in free-living women with GDM and compared to a time-matched standard-care control across pregnancy (diagnosis to delivery). We found increases in postprandial glucose at lunch and dinner, and physical activity patterns for PMW, however no changes in glycaemic variability, adherence to prescribed physical activity and birth outcomes were found. This suggests that PMW may be an important alternative to completing continuous physical activity in a population that fatigues easily and is short on time, however further research into the implications on postprandial glucose should be explored.

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Data Availability: The data that support the findings of this study are available from the corresponding author, MEF, upon reasonable request.

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Competing Interest: The authors declare there are no competing interests.

Contributors' Statement: MEF designed the study. HEC conducted the trial. HEC analysed the data. HEC and MEF wrote the initial draft of the manuscript. All authors edited the manuscript and approved the final draft

Figures and Tables

Figure 1. Experimental design. Participants were randomized into either 1. Standard-care control (CTL; 30 minutes of walking once daily; blue line), or 2. Postmeal walking (PMW; 3 x 10-minute walks after each main meal; yellow line) for the entirety of the trial. Continuous glucose monitoring (green line) was collected for 7-days at 28- and 35-weeks' gestation. ActivPAL inclinometer (purple line) was collected for 7-days at 28-, 32-, and 35-weeks' gestation. Birth outcomes were collected after delivery.

Figure 2. A. Mean 24 h incremental Area Under Curve (iAUC a.u.) for Postmeal Walking (PMW) vs. Control (CTL) at baseline, 28-, and 35-weeks' gestation. **B.** Mean adherence (min.day^{-1}) to PMW and CTL 30-min prescriptions at baseline, 28-, 32-, and 35-weeks' gestation. **C.** Mean daily stepping time for PMW and CTL at baseline, 28-, 32-, and 35-weeks' gestation. *PMW had significantly lower daily stepping time compared to CTL (group: p = 0.05). **D.** Mean daily sitting time for PMW and CTL at baseline, 28-, 32-, and 35-weeks' gestation. *PMW had significantly higher sitting time compared to CTL (group: p = 0.02).

Table 1. Mean glucose, adherence, and physical activity for postmeal walking (PMW), and standard-care (CTL).

		PMW	PMW	PMW	PMW	PMW	PMW	CTL	CTL	CTL	CTL	CTL	CTL
		Baseline	Baseline	28wk	28wk	35wk	35wk	Baseline	Baseline	Baseline	28wk	28wk	35wk
Postprandial Glucose	Postprandial Glucose	Postprandial Glucose	Postprandial Glucose	Postprandial Glucose	Postprandial Glucose	Postprandial Glucose	Postprandial Glucose	Postprandial Glucose	Postprandial Glucose	Postprandial Glucose	Postprandial Glucose	Postprandial Glucose	Postprandial Glucose

		PMW	PMW	PMW	PMW	PMW	PMW	CTL	CTL	CTL	CTL	CTL	CTL
Breakfast Mean, mmol.L^{-1}	Breakfast Mean, mmol.L^{-1}	5.8 ± 0.4 (5.9 ± 0.4)	5.8 ± 0.4 (5.9 ± 0.4)	5.9 ± 0.5 (5.9 ± 0.5)	5.9 ± 0.5 (5.9 ± 0.5)	5.80 ± 0.42 (5.80 ± 0.42)	5.80 ± 0.42 (5.80 ± 0.42)	5.6 ± 0.6 (5.5 ± 0.6)	5.6 ± 0.6 (5.5 ± 0.6)	5.6 ± 0.6 (5.5 ± 0.6)	5.6 ± 0.6 (5.6 ± 0.6)	5.6 ± 0.6 (5.6 ± 0.6)	5.8 ± 0.9 (5.8 ± 0.9)
Breakfast AUC	Breakfast AUC	1034 ± 76 (1043 ± 69)	1034 ± 76 (1043 ± 69)	1049 ± 95 (1051 ± 99)	1049 ± 95 (1051 ± 99)	1007 ± 84 (1007 ± 84)	1007 ± 84 (1007 ± 84)	954 ± 213 (947 ± 219)	954 ± 213 (947 ± 219)	954 ± 213 (947 ± 219)	963 ± 215 (962 ± 223)	963 ± 215 (962 ± 223)	986 ± 275 (986 ± 275)
Breakfast iAUC	Breakfast iAUC	76 ± 31 (74 ± 32)	76 ± 31 (74 ± 32)	78 ± 33 (77 ± 34)	78 ± 33 (77 ± 34)	95 ± 38 (95 ± 38)	95 ± 38 (95 ± 38)	72 ± 44 (71 ± 46)	72 ± 44 (71 ± 46)	72 ± 44 (71 ± 46)	64 ± 27 (66 ± 27)	64 ± 27 (66 ± 27)	90 ± 55 (90 ± 55)
Lunch Mean, mmol.L^{-1}	Lunch Mean, mmol.L^{-1}	5.8 ± 0.5 (5.9 ± 0.5)*	5.8 ± 0.5 (5.9 ± 0.5)*	6.0 ± 0.5 (5.9 ± 0.5)*	6.0 ± 0.5 (5.9 ± 0.5)*	5.9 ± 0.3 (5.9 ± 0.3)*	5.9 ± 0.3 (5.9 ± 0.3)*	5.6 ± 0.7 (5.5 ± 0.7)*	5.6 ± 0.7 (5.5 ± 0.7)*	5.6 ± 0.7 (5.5 ± 0.7)*	5.8 ± 0.8 (5.7 ± 0.8)*	5.8 ± 0.8 (5.7 ± 0.8)*	5.6 ± 0.7 (5.6 ± 0.7)*
Lunch AUC	Lunch AUC	1036 ± 96 (1049 ± 85)*	1036 ± 96 (1049 ± 85)*	1060 ± 92 (1058 ± 95)*	1060 ± 92 (1058 ± 95)*	1052 ± 47 (1052 ± 47)*	1052 ± 47 (1052 ± 47)*	965 ± 214 (959 ± 220)*	965 ± 214 (959 ± 220)*	965 ± 214 (959 ± 220)*	996 ± 238 (989 ± 245)*	996 ± 238 (989 ± 245)*	955 ± 251 (955 ± 251)
Lunch iAUC	Lunch iAUC	76 ± 50 (75 ± 52)	76 ± 50 (75 ± 52)	70 ± 25 (71 ± 26)	70 ± 25 (71 ± 26)	72 ± 19 (72 ± 19)	72 ± 19 (72 ± 19)	64 ± 43 (63 ± 44)	64 ± 43 (63 ± 44)	64 ± 43 (63 ± 44)	79 ± 46 (77 ± 47)	79 ± 46 (77 ± 47)	80 ± 51 (80 ± 51)
Dinner Mean, mmol.L^{-1}	Dinner Mean, mmol.L^{-1}	5.9 ± 0.5* (5.9 ± 0.5)	5.9 ± 0.5* (5.9 ± 0.5)	6.0 ± 0.6* (6.1 ± 0.6)	6.0 ± 0.6* (6.1 ± 0.6)	6.1 ± 0.3* (6.1 ± 0.3)	6.1 ± 0.3* (6.1 ± 0.3)	5.8 ± 0.7* (5.7 ± 0.6)	5.8 ± 0.7* (5.7 ± 0.6)	5.8 ± 0.7* (5.7 ± 0.6)	5.8 ± 0.6* (5.8 ± 0.7)	5.8 ± 0.6* (5.8 ± 0.7)	5.6 ± 0.8* (5.6 ± 0.8)
Dinner AUC	Dinner AUC	1048 ± 92* (1058 ± 86)	1048 ± 92* (1058 ± 86)	1076 ± 116* (1084 ± 117)	1076 ± 116* (1084 ± 117)	1069 ± 76* (1069 ± 76)	1069 ± 76* (1069 ± 76)	995 ± 221* (976 ± 216)	995 ± 221* (976 ± 216)	995 ± 221* (976 ± 216)	1003 ± 226* (998 ± 234)	1003 ± 226* (998 ± 234)	944 ± 257* (944 ± 257)

		PMW	PMW	PMW	PMW	PMW	PMW	CTL	CTL	CTL	CTL	CTL	CTL
Dinner iAUC	Dinner iAUC	71 ± 39 (70 ± 40)*	71 ± 39 (70 ± 40)*	65 ± 36 (63 ± 36)*	65 ± 36 (63 ± 36)*	65 ± 33 (65 ± 33)*	65 ± 33 (65 ± 33)*	66 ± 6 (58 ± 54)*	66 ± 6 (58 ± 54)*	66 ± 6 (58 ± 54)*	73 ± 46 (73 ± 48)*	73 ± 46 (73 ± 48)*	62 ± 31 (62 ± 31)*
24 h Mean, mmol.L^{-1}	24 h Mean, mmol.L^{-1}	24 h 5.4 ± 0.44 (5.5 ± 0.3)	24 h 5.4 ± 0.44 (5.5 ± 0.3)	24 h 5.6 ± 0.5 (5.6 ± 0.5)	24 h 5.6 ± 0.5 (5.6 ± 0.5)	24 h 5.5 ± 0.3 (5.5 ± 0.3)	24 h 5.5 ± 0.3 (5.5 ± 0.3)	24 h 5.3 ± 0.4 (5.3 ± 0.5)	24 h 5.3 ± 0.4 (5.3 ± 0.5)	24 h 5.3 ± 0.4 (5.3 ± 0.5)	24 h 5.3 ± 0.5 (5.3 ± 0.6)	24 h 5.3 ± 0.5 (5.3 ± 0.6)	24 h 5.3 ± 0.6 (5.3 ± 0.6)
MAG	MAG	0.9 ± 0.2 (0.9 ± 0.0)	0.9 ± 0.2 (0.9 ± 0.0)	0.8 ± 0.2 (0.8 ± 0.8)	0.8 ± 0.2 (0.8 ± 0.8)	0.8 ± 0.1 (0.8 ± 0.1)	0.8 ± 0.1 (0.8 ± 0.1)	0.9 ± 0.4 (0.9 ± 0.5)	0.9 ± 0.4 (0.9 ± 0.5)	0.9 ± 0.4 (0.9 ± 0.5)	0.9 ± 0.5 (0.9 ± 0.6)	0.9 ± 0.5 (0.9 ± 0.6)	1.0 ± 0.7 (1.0 ± 0.7)
SD	SD	0.8 ± 0.2 (0.7 ± 0.2)	0.8 ± 0.2 (0.7 ± 0.2)	0.7 ± 0.2 (0.7 ± 0.2)	0.7 ± 0.2 (0.7 ± 0.2)	0.7 ± 0.2 (0.7 ± 0.2)	0.7 ± 0.2 (0.7 ± 0.2)	0.7 ± 0.2 (0.7 ± 0.1)	0.7 ± 0.2 (0.7 ± 0.1)	0.7 ± 0.2 (0.7 ± 0.1)	0.7 ± 0.2 (0.7 ± 0.2)	0.7 ± 0.2 (0.7 ± 0.2)	0.7 ± 0.2 (0.7 ± 0.2)
AUC	AUC	7757 ± 632 (7866 ± 487)*	7757 ± 632 (7866 ± 487)*	8000 ± 725 (8037 ± 741)*	8000 ± 725 (8037 ± 741)*	7745 ± 524 (7745 ± 524)*	7745 ± 524 (7745 ± 524)*	7359 ± 1509 (7330 ± 1557)*	7359 ± 1509 (7330 ± 1557)*	7359 ± 1509 (7330 ± 1557)*	7346 ± 1619 (7325 ± 1677)*	7346 ± 1619 (7325 ± 1677)*	7181 ± 1879 (718 ± 1879
iAUC	iAUC	586 ± 2010 (497 ± 275)*	586 ± 2010 (497 ± 275)*	505 ± 188 (359 ± 172)*	505 ± 188 (359 ± 172)*	546 ± 153 (437 ± 224)*	546 ± 153 (437 ± 224)*	540 ± 316 (592 ± 216)*	540 ± 316 (592 ± 216)*	540 ± 316 (592 ± 216)*	371 ± 173 (512 ± 194)*	371 ± 173 (512 ± 194)*	437 ± 224 (546 ± 154)
Peak, mmol.L^{-1}	Peak, mmol.L^{-1}	7.4 ± 0.6 (7.5 ± 0.6)	7.4 ± 0.6 (7.5 ± 0.6)	7.5 ± 0.8 (7.5 ± 0.8)	7.5 ± 0.8 (7.5 ± 0.8)	7.2 ± 0.3 (7.2 ± 0.3)	7.2 ± 0.3 (7.2 ± 0.3)	7.1 ± 0.7 (7.0 ± 0.6)	7.1 ± 0.7 (7.0 ± 0.6)	7.1 ± 0.7 (7.0 ± 0.6)	7.2 ± 0.7 (7.3 ± 0.7)	7.2 ± 0.7 (7.3 ± 0.7)	7.1 ± 0.9 (7.1 ± 0.9)
Nocturna Mean, mmol.L^{-1}	Nocturna Mean, mmol.L^{-1}	Nocturna 4.9 ± 0.6 (5.0 ± 0.5)	Nocturna 4.9 ± 0.6 (5.0 ± 0.5)	Nocturna 5.5 ± 0.6 (5.2 ± 0.6)	Nocturna 5.5 ± 0.6 (5.2 ± 0.6)	Nocturna 4.9 ± 0.5 (4.9 ± 0.5)	Nocturna 4.9 ± 0.5 (4.9 ± 0.5)	Nocturna 5.0 ± 0.5 (5.0 ± 0.5)	Nocturna 5.0 ± 0.5 (5.0 ± 0.5)	Nocturna 5.0 ± 0.5 (5.0 ± 0.5)	Nocturna 5.0 ± 0.6 (5.0 ± 0.6)	Nocturna 5.0 ± 0.6 (5.0 ± 0.6)	Noct 4.9 ± 0.7 (4.9 ± 0.7)

		PMW	PMW	PMW	PMW	PMW	PMW	CTL	CTL	CTL	CTL	CTL	CTL
MAG	MAG	0.6 ± 0.2 (0.6 ± 0.1)	0.6 ± 0.2 (0.6 ± 0.1)	0.4 ± 0.1 (0.4 ± 0.1)	0.4 ± 0.1 (0.4 ± 0.1)	0.5 ± 0.2 (0.5 ± 0.2)	0.5 ± 0.2 (0.5 ± 0.2)	0.6 ± 0.5 (0.6 ± 0.6)	0.6 ± 0.5 (0.6 ± 0.6)	0.6 ± 0.5 (0.6 ± 0.6)	0.7 ± 1.0 (0.7 ± 1.0)	0.7 ± 1.0 (0.7 ± 1.0)	0.6 ± 0.3 (0.6 ± 0.3)
SD	SD	0.4 ± 0.1 (0.4 ± 0.1)	0.4 ± 0.1 (0.4 ± 0.1)	0.3 ± 0.1 (0.3 ± 0.1)	0.3 ± 0.1 (0.3 ± 0.1)	0.4 ± 0.2 (0.4 ± 0.2)	0.4 ± 0.2 (0.4 ± 0.2)	0.3 ± 0.1 (0.3 ± 0.1)	0.3 ± 0.1 (0.3 ± 0.1)	0.3 ± 0.1 (0.3 ± 0.1)	0.3 ± 0.2 (0.3 ± 0.2)	0.3 ± 0.2 (0.3 ± 0.2)	0.3 ± 0.1 (0.3 ± 0.1)
Finger pricks (fasting)	Finger pricks (fasting)	Finger pricks (fasting)	Finger pricks (fasting)	Finger pricks (fasting)	Finger pricks (fasting)	Finger pricks (fasting)	Finger pricks (fasting)	Finger pricks (fasting)	Finger pricks (fasting)	Finger pricks (fasting)	Finger pricks (fasting)	Finger pricks (fasting)	Fing prick (fast
Mean, mmol.L^{-1}	Mean, mmol.L^{-1}	5.0 ± 0.5 (5.0 ± 0.5)	5.0 ± 0.5 (5.0 ± 0.5)	5.0 ± 0.4 (5.0 ± 0.4)	5.0 ± 0.4 (5.0 ± 0.4)	4.7 ± 0.3 (4.7 ± 0.3)	4.7 ± 0.3 (4.7 ± 0.3)	4.9 ± 0.4 (4.9 ± 0.3)	4.9 ± 0.4 (4.9 ± 0.3)	4.9 ± 0.4 (4.9 ± 0.3)	4.9 ± 0.5 (4.9 ± 0.5)	4.9 ± 0.5 (4.9 ± 0.5)	5.0 ± 0.2 (5.0 ± 0.2)
	PMW Baseline	PMW Baseline	PMW 28wk	PMW 28wk	PMW 32wk	PMW 32wk	PMW 35wk	PMW 35wk	CTL Baseline	CTL 28wk	CTL 28wk	CTL 32wk	CTL 32wk
Adherence	Adherence	Adherence	Adherence	Adherence	Adherence	Adherence	Adherence	Adherence	Adherence	Adherence	Adherence	Adherence	Adhe
Average, min.day^{-1}	27 ± 13 (27 ± 13)	27 ± 13 (27 ± 13)	28 ± 10 (28 ± 10)	28 ± 10 (28 ± 10)	39 ± 13 (39 ± 13)	39 ± 13 (39 ± 13)	24.± 14 (24 ± 14)	24.± 14 (24 ± 14)	31 ± 14 (31 ± 15)	32 ± 14 (32 ± 14)	32 ± 14 (32 ± 14)	27 ± 11 (27 ± 12)	27 ± 11 (27 ± 12)
Activity Score during prescribed time, METs	2.6 ± 0.5 (2.6 ± 0.5)	2.6 ± 0.5 (2.6 ± 0.5)	2.2 ± 0.3 (2.2 ± 0.3)	2.2 ± 0.3 (2.2 ± 0.3)	2.4 ± 0.3 (2.4 ± 0.3)	2.4 ± 0.3 (2.4 ± 0.3)	2.3 ± 0.4 (2.3 ± 0.4)	2.3 ± 0.4 (2.3 ± 0.4)	2.4 ± 0.3 (2.4 ± 0.3)	2.5 ± 0.4 (2.5 ± 0.4)	2.5 ± 0.4 (2.5 ± 0.4)	2.3 ± 0.4 (2.2 ± 0.4)	2.3 ± 0.4 (2.2 ± 0.4)
Adherence at meals to intervention	Adherence at meals to intervention	Adherence at meals to intervention	Adherence at meals to intervention	Adherence at meals to intervention	Adherence at meals to intervention	Adherence at meals to intervention	Adherence at meals to intervention	Adherence at meals to intervention	Adherence at meals to intervention	Adherence at meals to intervention	Adherence at meals to intervention	Adherence at meals to intervention	Adhe at meal to inter
Breakfast, min	-	-	10 ± 6$^{\Psi}$ (10 ± 6) $^{\Psi}$	10 ± 6$^{\Psi}$ (10 ± 6) $^{\Psi}$	15 ± 11$^{\Psi}$ (15 ± 11) $^{\Psi}$	15 ± 11$^{\Psi}$ (15 ± 11) $^{\Psi}$	5 ± 3$^{\Psi}$ (5 ± 3) $^{\Psi}$	5 ± 3$^{\Psi}$ (5 ± 3) $^{\Psi}$	-	-	-	-	-

		PMW	PMW	PMW	PMW	PMW	PMW	CTL	CTL	CTL	CTL	CTL	CTL
Lunch, min	-	-	10 ± 5 (10 ± 5)	10 ± 5 (10 ± 5)	12 ± 5 (12 ± 5)	12 ± 5 (12 ± 5)	11 ± 10 (11 ± 10)	11 ± 10 (11 ± 10)	-	-	-	-	-
Dinner, min	-	-	8 ± 4$^{\Psi}$ (8 ± 4) $^{\Psi}$	8 ± 4$^{\Psi}$ (8 ± 4) $^{\Psi}$	12 ± 3$^{\Psi}$ (12 ± 3) $^{\Psi}$	12 ± 3$^{\Psi}$ (12 ± 3) $^{\Psi}$	8 ± 3$^{\Psi}$ (8 ± 3) $^{\Psi}$	8 ± 3$^{\Psi}$ (8 ± 3) $^{\Psi}$	-	-	-	-	-
Physical Activity	Physical Activity	Physical Activity	Physical Activity	Physical Activity	Physical Activity	Physical Activity	Physical Activity	Physical Activity	Physical Activity	Physical Activity	Physical Activity	Physical Activity	Phys Acti
Sitting bouts > 30 min, min	820 ± 97 (820 ± 97)	820 ± 97 (820 ± 97)	782 ± 92 (782 ± 92)	782 ± 92 (782 ± 92)	792 ± 78 (792 ± 78)	792 ± 78 (792 ± 78)	791 ± 73 (791 ± 73)	791 ± 73 (791 ± 73)	745 ± 123 (755 ± 119)	764 ± 104 (773 ± 102)	764 ± 104 (773 ± 102)	785 ± 128 (785 ± 134)	785 128 (785 ± 134)
Standing Time, min.day^{-1}	248 ± 112 (248 ± 112)	248 ± 112 (248 ± 112)	262 ± 68 262 ± 68)	262 ± 68 262 ± 68)	249 ± 74 (249 ± 74)	249 ± 74 (249 ± 74)	280 ± 84 (280 ± 84)	280 ± 84 (280 ± 84)	270 ± 92 (269 ± 94)	266 ± 54 (265 ± 56)	266 ± 54 (265 ± 56)	259 ± 64 (261 ± 67)	259 64 (261 ± 67
Stepping Time, min.day^{-1}	99 ± 22* (99 ± 22)	99 ± 22* (99 ± 22)	103 ± 32* (103 ± 32)	103 ± 32* (103 ± 32)	106 ± 22* (106 ± 22)	106 ± 22* (106 ± 22)	89 ± 22* (89 ± 45)	89 ± 22* (89 ± 45)	124 ± 43* (122 ± 44)	121 ± 41* (120 ± 42)	121 ± 41* (120 ± 42)	103 ± 42* (102 ± 44)	103 ± 42* (102 ± 44)
Sitting Time, min.day^{-1}	1094 ± 121* (1094 ± 121)*	1094 ± 121* (1094 ± 121)*	1075 ± 84* (1075 ± 84)*	1075 ± 84* (1075 ± 84)*	1085 ± 78* (1085 ± 78)*	1085 ± 78* (1085 ± 78)*	1071 ± 90* (1071 ± 90)*	1071 ± 90* (1071 ± 90)*	1000 ± 172* (1000 ± 177)*	987 ± 202* (986 ± 209)*	987 ± 202* (986 ± 209)*	1031 ± 187* (1026 ± 194)*	1031 ± 187* (102 ± 194)
Activity Score, METs.h^{-1}	34 ± 1.1 (34 ± 1.1)	34 ± 1.1 (34 ± 1.1)	34 ± 1 (34 ± 1)	34 ± 1 (34 ± 1)	34 ± 1 (34 ± 1)	34 ± 1 (34 ± 1)	33 ± 1 (33 ± 1)	33 ± 1 (33 ± 1)	34 ± 1 (34 ± 1)	34 ± 1 (34 ± 1)	34 ± 1 (34 ± 1)	34 ± 1 (34 ± 1)	34 ± 1 (34 ± 1)

BMI Unmatched (BMI matched). AUC= Area Under the Curve, iAUC=incremental AUC, MAG=Mean absolute Glucose, MET=Metabolic Equivalent, SD. Significance ($p < 0.05$) * group, $^{\Psi}$ time,$^{\#}$ interaction.

Table 2. Neonatal and delivery birth outcomes for postmeal walking (PMW), and standard-care (CTL).

	PMW (n = 8)	CTL (n = 14)	Significance
Labour Onset, n Spontaneous Induction	1 3	3 8	0.936
Type of Birth, n Normal Vaginal Delivery Caesarean Section	6 2	7 7	0.273
Gestation at delivery, weeks	39.23 ± 0.88	39.10 ± 1.24	0.798
Birth Weight, kg	3.40 ± 0.52	3.51 ± 0.52	0.651
Birth Length, cm	51.06 ± 1.99	50.64 ± 2.63	0.700
Head Circumference, cm	34.31 ± 2.02	34.96 ± 1.74	0.430
Sex, n Male Female	7 7	4 4	1.00
Hypoglycaemia Incidences, n 0 1 2 3 4	8 0 0 0 0	13 0 0 0 1	0.463

Supplementary Figure 1. Study CONSORT flow diagram. Randomised clinical trial, participants were randomised into one of two interventions: 30 minutes of continuous walking daily (CTL) or 3 x 10-minute walks after each main meal daily (PMW).

Supplementary Figure 2. Time of day and frequencies (n) at which physical activity bouts were completed for CTL intervention.

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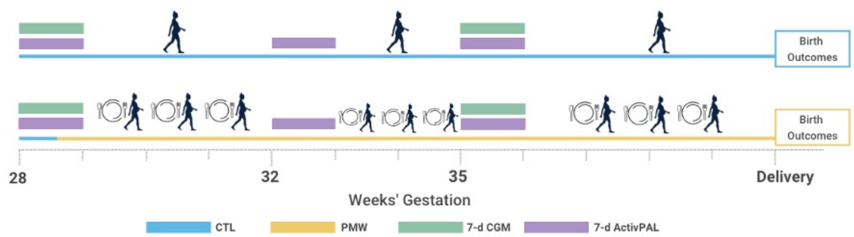

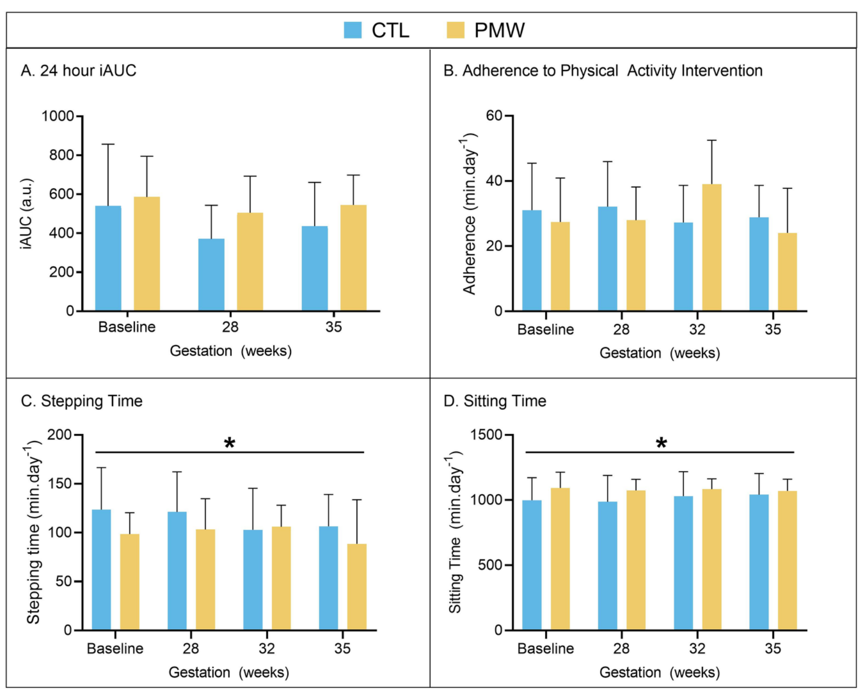

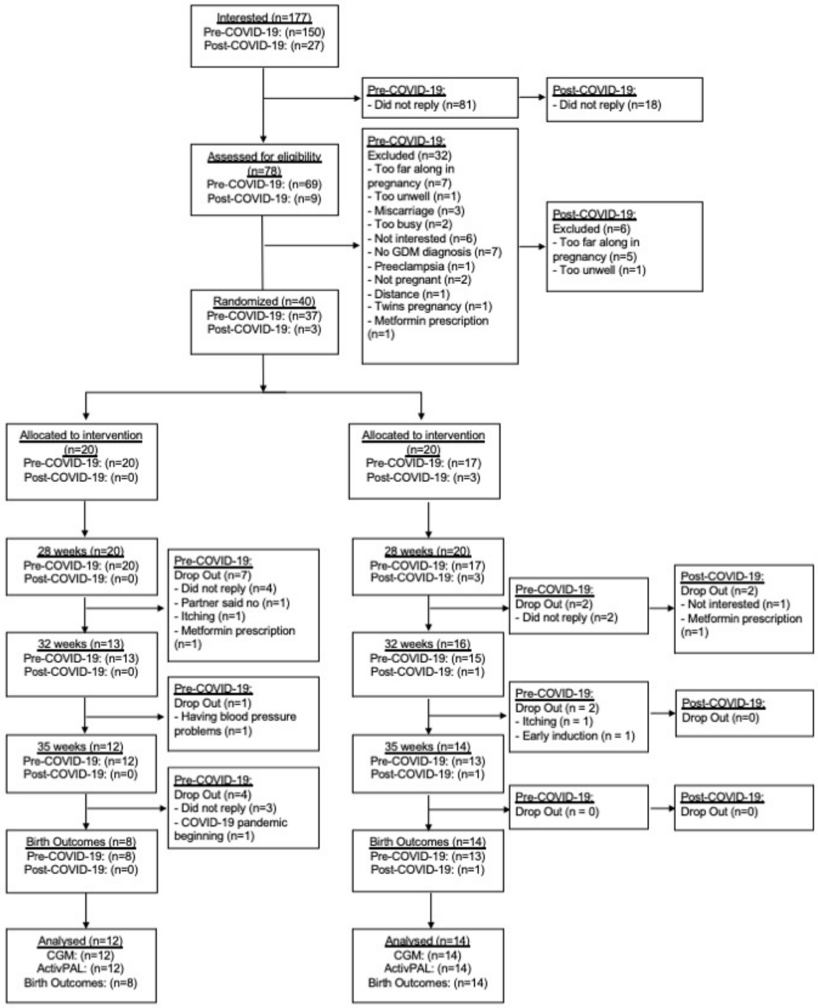
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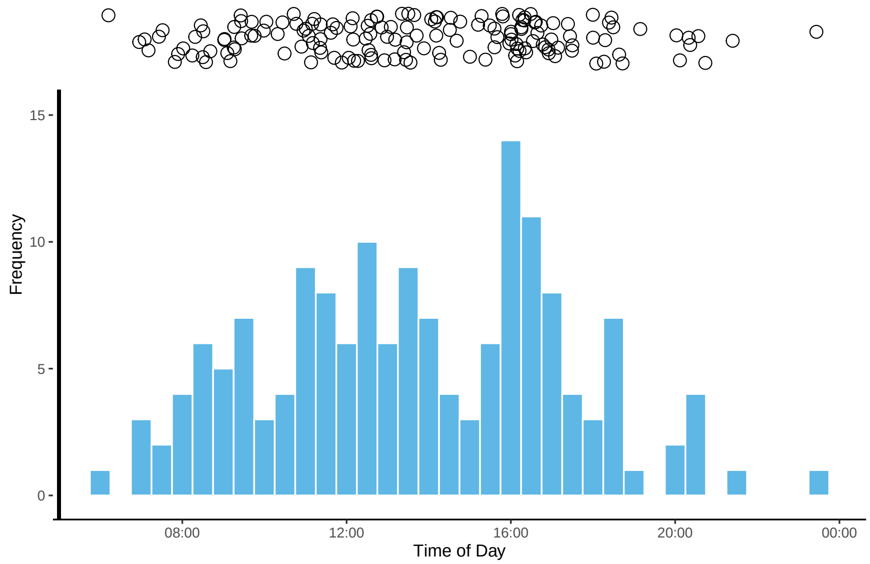
Pre-COVID-19: (n=150)
Post-COVID-19: (n=27)
Pre-COVID-19:
- Did not reply (n=81)
Post-COVID-19:
- Did not reply (n=18)
Assessed for eligibility (n=78)
Pre-COVID-19: (n=69)
Post-COVID-19: (n=9)
Pre-COVID-19:
Excluded (n=32)
- Too far along in pregnancy (n=7)
- Too unwell (n=1)
- Miscarriage (n=3)
- Too busy (n=2)
- Not interested (n=6)
- No GDM diagnosis (n=7)
- Preeclampsia (n=1)
- Not pregnant (n=2)
- Distance (n=1)
- Twins pregnancy (n=1)
- Metformin prescription (n=1)
Post-COVID-19:
Excluded (n=6)
- Too far along in pregnancy (n=5)
- Too unwell (n=1)
Randomized (n=40)
Pre-COVID-19: (n=37)
Post-COVID-19: (n=3)
Allocated to intervention (n=20)
Pre-COVID-19: (n=20)
Post-COVID-19: (n=0)
Allocated to intervention (n=20)
Pre-COVID-19: (n=17)
Post-COVID-19: (n=3)
28 weeks (n=20)
Pre-COVID-19: (n=20)
Post-COVID-19: (n=0)
Pre-COVID-19:
Drop Out (n=7)
- Did not reply (n=4)
- Partner said no (n=1)
- Itching (n=1)
- Metformin prescription (n=1)
32 weeks (n=13)
Pre-COVID-19: (n=13)
Post-COVID-19: (n=0)
Pre-COVID-19:
Drop Out (n=1)
- Having blood pressure problems (n=1)
35 weeks (n=12)
Pre-COVID-19: (n=12)
Post-COVID-19: (n=0)
Pre-COVID-19:
Drop Out (n=4)
- Did not reply (n=3)
- COVID-19 pandemic beginning (n=1)
Birth Outcomes (n=8)
Pre-COVID-19: (n=8)
Post-COVID-19: (n=0)
Analysed (n=12)
CGM: (n=12)
ActivPAL: (n=12)
Birth Outcomes: (n=8)
28 weeks (n=20)
Pre-COVID-19: (n=17)
Post-COVID-19: (n=3)
Pre-COVID-19:
Drop Out (n=2)
- Did not reply (n=2)
Post-COVID-19:
Drop Out (n=2)
- Not interested (n=1)
- Metformin prescription (n=1)
32 weeks (n=16)
Pre-COVID-19: (n=15)
Post-COVID-19: (n=1)
Pre-COVID-19:
Drop Out (n = 2)
- Itching (n = 1)
- Early induction (n = 1)
Post-COVID-19:
Drop Out (n=0)
35 weeks (n=14)
Pre-COVID-19: (n=13)
Post-COVID-19: (n=1)
Pre-COVID-19:
Drop Out (n = 0)
Post-COVID-19:
Drop Out (n=0)
Birth Outcomes (n=14)
Pre-COVID-19: (n=13)
Post-COVID-19: (n=1)
Analysed (n=14)
CGM: (n=14)
ActivPAL: (n=14)
Birth Outcomes: (n=14)


15
10
5
0
Frequency
08:00
12:00
16:00
20:00
00:00
Time of Day