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Randomized Controlled Trial of Home-based Lifestyle Therapy on Postpartum Weight in Underserved Women with Overweight/Obesity

Debra Haire-Joshu, PhD,

Brown School and Department of Medicine, Washington University in St. Louis, St. Louis, Missouri, USA

Alison G. Cahill, MD, MSCI,

Department of Obstetrics and Gynecology, Washington University in St. Louis, St. Louis, Missouri, USA

Richard I. Stein, PhD,

Center for Human Nutrition, Washington University in St. Louis, St. Louis, Missouri, 63110

W. Todd Cade, PT, PhD,

Program in Physical Therapy, Washington University in St. Louis, St. Louis, Missouri, USA

Candice L. Woolfolk, PhD, MPH,

Department of Obstetrics and Gynecology, Washington University in St. Louis, St. Louis, Missouri, USA

Kelle Moley, MD,

Department of Obstetrics and Gynecology, Washington University in St. Louis, St. Louis, Missouri, USA

Amit Mathur, MD,

Department of Pediatrics, Washington University in St. Louis, St. Louis, Missouri, USA

Cynthia D. Schwarz, RD, MS, MPH,

Brown School and Department of Medicine, Washington University in St. Louis, St. Louis, Missouri, USA

Kenneth B. Schechtman, PhD, and

Department of Biostatistics, Washington University in St. Louis, St. Louis, Missouri, 63110

Samuel Klein, MD

Corresponding author: Debra Haire-Joshu, Brown School and School of Medicine, Washington University in St. Louis, 1 Brookings Drive CB 1196, St. Louis, MO 63110; djosu@wustl.edu.

Authors' contributions: Study concept and design: Drs. Haire-Joshu, Klein, Cahill, Cade, Moley, Stein, Mathur. Data collection: Drs. Haire-Joshu, Cahill, Cade, Schwarz, Stein, Mathur, Moley, Klein. Analysis and interpretation of data: Drs. Haire-Joshu, Klein, Schechtman, Woolfolk. Drafting of manuscript: Drs. Haire-Joshu, Klein, Cade, Stein, Woolfolk, Mathur, Moley, Cahill. Critical revision of the manuscript: Drs. Haire-Joshu, Klein, Cade, Schwarz, Stein, Woolfolk, Mathur, Moley, Cahill. Obtain funding: Drs. Haire-Joshu, Klein, Cahill.

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Center for Human Nutrition, Washington University in St. Louis, St. Louis, Missouri, 63110

Abstract

Objective—To assess the efficacy of a home-based lifestyle intervention delivered through Parents as Teachers (PAT), a national home visiting organization, designed to minimize excessive weight gain through 12-months postpartum in socioeconomically disadvantaged (SED) African American women with overweight or obesity.

Methods—This randomized controlled trial was conducted at a single center as part of the LIFE-Moms consortium. Analysis was conducted with 185 SED African American women (BMI 25.0–45.0 kg/m² at pregnancy onset), retained from an original sample of 267 randomized to standard PAT or PAT+Lifestyle, which embedded lifestyle therapy within standard PAT delivered prenatally and for 12-months postpartum.

Results—Compared with standard PAT, the PAT+Lifestyle group gained less weight (2.5 kg vs. 5.7 kg, $P=0.01$) and were more likely to return to their baseline weight (38.0% vs. 21.5% $P=0.01$) from baseline to 12-months postpartum. There were no differences between groups in cardiometabolic outcomes, indices of glycemic control and insulin sensitivity, and plasma lipid profile. The estimated cost of PAT+Lifestyle was \$81 more to deliver per family than standard PAT.

Conclusions—PAT+Lifestyle decreases weight gain during pregnancy through 12-months postpartum in SED African American women with overweight or obesity at the start of pregnancy with minimal additional cost.

Keywords

Obesity; Postpartum weight; African American women; Home-based lifestyle therapy

Introduction

The prevalence of overweight and obesity is high among African American women, particularly those who are underserved and socioeconomically disadvantaged (SED) (1–4). Women with obesity are at increased risk of excessive gestational weight gain (GWG) during pregnancy and have greater weight retention one year after delivery, thereby increasing the severity of their obesity and the risk of obesity-related medical co-morbidities (4–6). Although lifestyle intervention is recommended for pregnant women with obesity to prevent excessive GWG and postpartum weight retention (7), providing effective real-world therapy in SED women is difficult because of the many barriers to program participation related to parenting responsibilities, costs, limited transportation, and other stressors (8–10).

Partnerships with organizations trusted by women in the community offer an infrastructure for overcoming challenges associated with reaching young mothers, particularly those who are SED (8, 11–14). Parents As Teachers (PAT) is a national home visiting organization whose mission is to empower parents as their child's most influential teacher. PAT trains parent educators to deliver an evidence-based curriculum through home visits. PAT visits are generally reimbursed via federal (e.g. Maternal Infant, and Early Childhood Home Visiting

Program) and/or state programs (e.g. State Department of Elementary or Secondary Education). PAT visits are provided free of charge to any high needs parents as defined by: low educational attainment, low income, parent or child with disabilities/chronic health condition, recent immigrant family, parent with mental illness, or unstable housing (15). In 2016–17 PAT was located in all 50 states and reached nearly 190,000 families, 227,000 children, and 20,100 pregnant women (16).

We previously found that working with PAT provided an effective approach for implementing dietary interventions targeted to African American parents of infants (17), rural parents of young children (18), teen mothers (9), and overweight mothers at risk for diabetes (19). In addition, we recently completed a randomized controlled trial to determine whether partnering with PAT to provide a home-based lifestyle intervention could overcome barriers to behavior change and decrease GWG in this high-risk population (20). Our data demonstrated that, compared with standard PAT, embedding a lifestyle intervention focused on eating and physical activity behavior change strategies within the PAT prenatal program (PAT+Lifestyle) decreased GWG and lowered maternal systolic blood pressure. However, there was no difference in other maternal cardiometabolic outcomes, pregnancy complications, or neonatal outcomes. The effect of continuing this intervention on postpartum weight and metabolic health is not known.

The primary purpose of the present randomized controlled trial was to determine the efficacy of PAT+Lifestyle, provided both prenatally and postpartum, in minimizing the long-term, 12-month postpartum increase in body weight that often occurs in SED African American women who are overweight or obese at the onset of pregnancy. In addition, we assessed obesity-related cardiometabolic outcomes (i.e. blood pressure, insulin sensitivity and lipid profile) at 12-months postpartum as well as the cost of providing the PAT+Lifestyle intervention. We hypothesized that compared with women randomized to standard PAT, those randomized to PAT+Lifestyle would have a blunted increase in body weight at 12-months postpartum and a healthier cardiometabolic profile, at minimal additional cost.

Methods

Study participants

The study population was comprised of 267 women who were recruited from the obstetrical clinics at a single medical center (Barnes-Jewish Hospital and Washington University School of Medicine in St. Louis, MO) between October 2012 and March 2016. All participants identified as African American and met the following additional eligibility criteria: 1) age 18–45 years; 2) body mass index (BMI) 25.0–45.0 kg/m² measured at the initial visit during the first trimester; 3) singleton viable gestation at or before 15 0/7 weeks (established by date of last menstrual period if it was within 5 days of first trimester ultrasound dating, or by ultrasound itself); and 4) SED determined by Medicaid status, or home zip code associated with a median household income below the poverty level. All women provided written informed consent before their participation in this study, which was approved by the Institutional Review Board of Washington University in St. Louis, MO ([ClinicalTrials.gov: NCT01768793](https://clinicaltrials.gov/ct2/show/study/NCT01768793)).

Procedures

This study was conducted at one site of the LIFE-Moms consortium, a collaborative group evaluating the effect of lifestyle therapies on maternal GWG and maternal, fetal and infant health in pregnant women with overweight or obesity (21). Women were randomly assigned by study staff in a 1:1 allocation to treatment with either standard PAT or PAT+Lifestyle, which began after the baseline assessment and continued until 12-months after parturition. A random number generator and a fixed allocation block strategy provided by study statisticians were used to determine the randomization sequence. Investigators and clinical research staff who were involved in collecting primary and secondary outcome data, did not deliver the intervention and were blinded to group assignment. The results from the prenatal intervention (baseline to 35 weeks) were previously reported (20). Data were obtained at 15 weeks of gestation (baseline) and 12-months postpartum by research staff at the Washington University Clinical and Translational Research Unit. Body weight, plasma glucose, insulin and lipid concentrations, were collected as well as the plasma glucose and insulin response to an oral glucose load (blood samples obtained before and at 30, 60, 90, and 120 minutes after ingesting a 75-g glucose drink).

Intervention staff, consisting of parent educators overseen by a study interventionist, were responsible for conducting all aspects of either the standard PAT or PAT+Lifestyle intervention. Intervention staff were not involved in primary or secondary data collection. To assure intervention fidelity, parent educators audio-recorded each of their home visits and completed lesson plan checklists documenting delivery of content. The study interventionist randomly observed four home visits and reviewed four audio-recorded visits each year for each parent educator, to assure satisfactory completion of content. The additional per-family cost of providing the PAT+Lifestyle intervention to standard PAT was calculated using PAT recommended cost and budgeting guidelines (15) which includes parent educator salary, training costs, home visit preparation and contact time, travel reimbursement based on car mileage, and cost of supplies per visit.

All participants were seen by parent educators during home visits, every other week during pregnancy, and every month for 12-months postpartum. The standard PAT curriculum provided parents with evidence-based maternal, infant and early childhood information designed to increase parenting knowledge and skills using a family strength-based model to support the role of the parent as their child's first and best teacher (22). Parent educators delivering the standard PAT prenatal curriculum prepared the mother for what to expect with a new baby by providing developmentally appropriate child-focused information; the curriculum does not include information on maternal weight or lifestyle change. After childbirth, the parent educator offered social support for parents in meeting the physical, emotional, and psychological milestones as children transition across developmental stages (22).

The PAT+Lifestyle postpartum curriculum goal was for mothers to return to their baseline weight by reinforcing the eating and activity behaviors learned prenatally, while also addressing challenges faced by the new parent of an infant (e.g. child feeding, sleep deprivation), as described in detail elsewhere (20). The PAT+Lifestyle curriculum embedded content adapted from the Diabetes Prevention Program within the standard PAT curriculum

and home visits (23). An evaluation of the mother by the PAT parent educator was used to individualize the lifestyle content to address specific eating and physical activity behaviors that affect energy intake and physical activity (e.g. substitute water for sugar-sweetened beverages, reduce portion sizes, walk 30 minutes every day). Social Cognitive Theory was used to promote behavior change emphasizing parenting roles, and targeting intrapersonal (e.g. self-assessment, goal setting, reinforcement), interpersonal (e.g. observational learning/parental modeling), and home environment (e.g. child exposure to media/TV, food access) strategies (24). In addition to training on the standard curriculum, PAT+Lifestyle parent educators received 8 hours of additional training including: 1) an overview of the intervention protocol; 2) home visit practice sessions with other parent educators; and 3) feedback from trainers. Because the PAT+Lifestyle intervention was embedded within the standard curriculum it was reimbursable as part of routinely delivered home visits.

The primary outcome of this study was percent change in body weight from baseline to 12-months postpartum. Secondary outcomes were: 1) proportion of women returning to baseline weight at 12-months postpartum, and 2) proportion of women with GWG (total weight gain from the baseline visit to 35–36 weeks gestation visit) categorized as above or not above Institute of Medicine weight gain during pregnancy guidelines (25).

Statistical Analysis

A modified intention-to-treat analysis was performed. All subjects were analyzed within the group to which they were randomized unless they provided no follow-up data or could not provide valid data due to a second pregnancy. Baseline demographic factors and characteristics of each treatment group were compared using the Student's *t*-test or Mann Whitney *U* test (continuous variables) or the χ^2 or Fisher's exact test (categorical variables), as appropriate. Normality was tested with the Kolmogorov-Smirnov test. To test the primary hypothesis, an Analysis of Covariance (ANCOVA) was performed to determine whether there was a significant difference in weight change and metabolic measures between baseline and 12-month postpartum visit by intervention group. Block randomization was used to balance the treatment groups on maternal age, BMI at randomization, baseline weight (weight at randomization), gestational age at randomization, Medicaid status, education, income, gravidity, nulliparity, gestational diabetes, infant birthweight, and breastfeeding initiation. We tested for confounding factors to further evaluate whether any unexpected imbalances between groups could have affected our results. BMI and gestational age at randomization were chosen a priori as confounders in the final models. The proportion of women with a 12-month postpartum weight that returned to or below baseline weight was compared by intervention group using the χ^2 or Fisher's exact test as appropriate, and log binomial regression was used to compute relative risks and 95% confidence intervals. Women with missing data on pre-specified factors were excluded from analysis as per study protocol; missing data were assumed to be missing at random. A sensitivity analysis was conducted to compare women who completed and did not complete the 12-month postpartum visit on maternal age, BMI, weight, and gestational age at baseline, Medicaid status, education, income, gravidity, nulliparity, gestational diabetes, infant birthweight, and breastfeeding initiation. A *P*-value of <0.05 was considered

statistically significant. SAS version 9.4 (SAS Institute Inc., Cary, NC) was used for all analyses.

Power computations were based on the primary endpoint of percent of subjects meeting IOM guidelines for GWG, and on two-sided tests at the 0.05 level of significance, as described previously (20). We estimated that 57% of standard PAT participants would meet IOM recommendations for GWG and that 120 participants who completed the intervention in each group would yield a power of 0.8 to detect a 30% increase to 74% in the PAT +Lifestyle group and a power of 0.9 to detect a 35% increase to 77%. We expected a 10% dropout rate prior to parturition, and successfully sought to randomize 133 participants into each group. Based on the assumption that 100 participants would remain at 12 months postpartum, the power was 0.8 and 0.9 or 93% and 95%, respectively.

Results

Participant demographics and flow

The flow of participants throughout the study is shown in Figure 1. Baseline characteristics of the study participants were not different between groups (Table 1). The mean and standard deviation for gestational age at the prenatal visit used to define BMI is 13.3 ± 1.6 weeks. Among the 267 randomized participants, 185 completed the 12-month postpartum visit. The major reasons for non-completion were women who were withdrawn because of a new pregnancy (8.9%) and women who could not be located (17.9%). Excluding participants who were ineligible due to new pregnancy, the retention rate for the 12-month visit was 76.1%. No significant differences in baseline characteristics were observed between women who completed vs. did not complete the 12-month postpartum visit in the sensitivity analysis (data not shown).

Body weight

The increase in body weight from baseline to 12-months postpartum, after adjusting for BMI and gestational age at randomization, was less in the PAT+Lifestyle group than in the standard PAT group (2.5 ± 7.4 kg vs. 5.7 ± 8.8 kg, $P=0.01$) (Figure 2). In women who did not exceed the IOM guidelines for GWG, those treated with PAT+Lifestyle retained less weight at 12-months after delivery than those treated with standard PAT (0.9 ± 6.8 kg and 4.2 ± 8.6 kg, $p=0.03$), after adjusting for BMI and gestational age at randomization. In women who exceeded the IOM guidelines for GWG, those treated with PAT+Lifestyle tended to retain less weight at 12-months postpartum than those treated with standard PAT. However, the differences between groups were not statistically significant (4.9 ± 7.7 kg and 7.6 ± 8.9 kg, $p=0.19$). A greater percentage of women in the PAT+Lifestyle group than in the standard PAT group returned to their baseline weight or less at 12-months postpartum (38.0% and 21.5% in PAT+Lifestyle and standard PAT groups, respectively, $P=0.01$); the difference between groups remained statistically significant after adjusting for BMI and gestational age at randomization (adjusted relative risk 2.24, 95%CI 1.17–4.29).

Cardiometabolic outcomes

No significant differences in changes in blood pressure, indices of glycemic control and insulin sensitivity, or plasma lipid profile, from baseline to 12-months postpartum, were detected between PAT+Lifestyle and standard PAT groups (Table 2).

Compliance with visits and cost of intervention

The median number of total prenatal and postpartum home visits were not different between women treated with PAT+Lifestyle and those treated with standard PAT [17 (12, 21) and 16 (13, 20) visits, respectively, $P = 0.72$]. The postpartum visits accounted for 48.5% of the total number of visits, and the median number of postpartum visits were not different between groups [9 (5, 12) and 8 (4, 12) visits for PAT+Lifestyle and standard PAT, respectively ($P = 0.56$)]. The average duration of each visit was longer in the PAT+Lifestyle than the standard PAT group (49.8 ± 10.3 min and 38.2 ± 13.0 min, $P < 0.01$). Overall, the fidelity to the intervention was 75% (75%–100%).

The cost to implement standard PAT was calculated based on standard parent educator training costs of \$1,400 with a yearly professional development cost of \$450; average parent educator salary for 2 hours of preparation time plus the cost of a 1-hour home visit (\$54.69); mileage estimate per visit (\$10.80); and supplies per visit (\$5.00). Costs for the PAT +Lifestyle intervention included the standard intervention costs plus the costs for the additional 8 hours of training (\$450 per parent educator). Even though the duration of the home visits were longer in the PAT+Lifestyle intervention, they did not exceed the 60 minutes allotted for completing a home visit, and upon which costs for reimbursement were calculated. Therefore, the total cost per family to implement standard PAT and PAT +Lifestyle from early pregnancy until 12-months postpartum was \$1,160.65 and \$1,241.68, respectively; the additional cost per family for providing PAT+Lifestyle was \$81.03. The addition of lifestyle therapy to standard PAT was covered as part of routine home visits and did not result in any charges to the family.

Discussion

This randomized controlled trial was conducted to evaluate whether a home-based parent education program (PAT+Lifestyle) delivered both prenatally and postpartum, could limit weight gain from early pregnancy (~15 weeks gestation) to 12-months postpartum in underserved, SED African American women with overweight or obesity at the onset of pregnancy. Our data demonstrate that women who received PAT+Lifestyle gained less weight and were more likely to return to their baseline weight at 12-months after parturition than women treated with the standard PAT program. In addition, the cost of providing PAT +Lifestyle during pregnancy and for 12-months postpartum was only about \$81 more than providing standard PAT. This home-based lifestyle intervention program successfully reduced weight gained during pregnancy and retained during the postpartum period in a vulnerable, high-risk population. Moreover, providing this therapy in partnership with an established national home visiting program allows for widespread dissemination at minimal additional cost.

The results from several randomized controlled trials have shown that providing lifestyle therapy only during pregnancy or the postpartum period did not decrease the amount of weight gained from the onset of pregnancy to 12-months postpartum (4, 26–31). We are aware of one study, the Delta Healthy Sprouts Trial, that used PAT to provide home-based lifestyle weight management during pregnancy and 12-months postpartum (10, 32). That trial, conducted in women living in the rural Lower Mississippi Delta region, did not detect a significant difference in postpartum weight loss or retention between women treated with PAT lifestyle enhanced intervention and those treated with PAT alone. The reasons for the different outcomes in the Delta Healthy Sprouts Trial and our study are not clear, but may be related to differences in study populations and the lifestyle curriculum. Nearly half of the participants in the Delta Healthy Sprouts Trial were normal-weight before pregnancy, and that trial enrolled fewer participants than in our study, which may have decreased the ability to detect differences between treatment groups. The lifestyle curriculum in the Delta Healthy Sprouts Trial also involved a complex intervention, including personalized eating plans that targeted energy restriction, diet quality, and multiple behaviors simultaneously. In contrast, PAT+Lifestyle focused on a limited number of specific and simple eating and activity behaviors, individualized to the family's needs, and embedded within standard parent-child activities and content of routine home visits, requiring limited additional time (20).

Despite the beneficial effects of PAT+Lifestyle on postpartum body weight, there were no therapeutic effects on cardiometabolic outcomes. However, the health benefits of minimizing total weight gain that occurs from the onset of pregnancy to 12-months postpartum in women with overweight or obesity are likely to occur years later by reducing or preventing the medical complications associated with weight retention after pregnancy and a chronic increase in body fat (33). Data from previous studies have shown GWG and postpartum weight retention at 12-months are associated with changes in weight status and the development of obesity-related comorbidities decades after pregnancy (34, 35). Early adulthood (18–35 years of age) is a vulnerable period for excessive weight gain and the development of obesity, particularly among African American women and those who are already overweight (33, 34, 36, 37). A 5-kg weight gain during early adulthood, which is less than the average weight gained in women treated with standard PAT in our study, is associated with an increased risk of serious diseases, including type 2 diabetes, cardiovascular disease, and cancer, by middle and later adulthood (33). Minimizing total prenatal and postpartum weight gain in SED African American women by treatment with PAT+Lifestyle has considerable clinical implications by preventing future obesity-related medical comorbidities.

Implementing effective lifestyle change in pregnant or postpartum SED women is difficult because of the many burdens that interfere with participation or intervention uptake, including limited finances, work responsibilities, and childcare support (38). The use of PAT to provide lifestyle weight management therapy takes advantage of a home visiting structure that is free-of-charge, already accepted by the mother, and overcomes many of the major barriers for implementing successful lifestyle therapy in SED African American women (23, 39, 40). Additionally, PAT services are delivered until the last child in the home reaches school age, allowing for ongoing reinforcement of lifestyle behavior change. The additional cost of PAT+Lifestyle for the entire prenatal and 12-month postpartum intervention was

minimal. Because the content is delivered as part of the standard PAT routine visit, it is covered by federal and state funds, providing ongoing support for implementation.

This study has several limitations. The generalizability of our results may be limited because participants were from a single racial/ethnic group and were from homogeneous sociodemographic and geographic backgrounds, which may not translate to other populations. In addition we only evaluated women at 12 months postpartum so we are unable to determine if results will be maintained long-term and to inform patterns of weight gain or loss over time.

In conclusion, the present study demonstrates that providing a home-based lifestyle weight management therapy effectively minimizes maternal weight gain at 12-months postpartum in underserved, SED African American women with obesity at the onset of pregnancy. Embedding PAT+Lifestyle within the national infrastructure of PAT overcomes many of the barriers faced by SED women that prevent active participation in this kind of intervention. Moreover PAT, which has more than 3,200 sites across the United States, provides a sustainable and scalable program for providing an effective weight management intervention for this high-risk population. Based on these findings the PAT National Center, which is responsible for training and certifying all parent educators to deliver PAT curricula, is planning to disseminate and implement PAT+Lifestyle through their national network of sites. Additional research will be needed to determine whether extending PAT+Lifestyle throughout the entire PAT program has important long-term maternal weight and health benefits.

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Study Importance Questions

What is already known about this subject

- Prevalence of overweight and obesity are high among pregnant women who are socioeconomically disadvantaged (SED) and among African American women.
- African American women are likely to retain twice as much weight postpartum as are Caucasian women.
- Weight gain during pregnancy and postpartum are important causes of long-term weight gain in women and the development of obesity-related comorbidities decades after pregnancy.

What this study adds

- Home-based lifestyle therapy delivered through Parents as Teachers (PAT) decreases 12-month postpartum weight gain in SED African American women with overweight or obesity.
- A lifestyle intervention embedded within PAT, a national home visiting organization, provides a sustainable, scalable, and effective national weight management intervention for SED African American women.

Figure 1.
Flow of study participants

Figure 2.

Percent (top panel) and absolute (bottom panel) change in body weight from baseline to 12 months postpartum in women treated with standard PAT (white bars) or PAT+Lifestyle (black bars) in total participants and in subgroups in whom gestational weight gain (GWG) was either not greater than, or was greater than, Institute of Medicine (IOM) guidelines.

* Value significantly different from corresponding standard PAT value, $P < 0.03$. Values are means $\pm$ SEM.

Table 1.

Baseline Characteristics of Standard PAT and PAT+Lifestyle Groups

	Standard PAT (N=93)	PAT+Lifestyle (N=92)	P value
Maternal age (yrs) ^a	26.16 ± 5.0	24.74 ± 5.0	0.06
Gestational age at randomization (wks)	14 (12,15)	14 (12,15)	0.99
Baseline weight (kg) ^a	86.43 ± 15.0	87.24 ± 15.8	0.72
Baseline BMI (kg/m ²) ^b	31.93 ± 5.0	32.73 ± 5.2	0.29
BMI Category ^c			0.68
Overweight	34 (35.6)	31 (33.7)	
Obese	59 (63.4)	61 (66.3)	
On Medicaid ^c	84 (90.3)	83 (90.2)	0.98
Maternal education ^c			0.46
Less than high school	15 (16.1)	17 (18.5)	
High school graduate	36 (38.7)	44 (47.8)	
Some college	33 (35.4)	24 (26.1)	
College graduate	9 (9.7)	7 (7.6)	
Income level ^c			0.62
<\$25,000	84 (90.3)	85 (92.4)	
\$25,000	9 (9.7)	7 (7.6)	
Gravidity ^b	2 (1, 3)	2 (1, 3)	0.17
Nulliparous	17 (18.3)	23 (25.0)	0.27
Gestational diabetes ^c	9 (9.7)	10 (10.9)	0.79
Infant birth weight (g) ^a	3132.7 ± 442.9	3106.4 ± 442.8	0.71
Initiated some breastfeeding ^c	61 (65.6)	65 (70.7)	0.46
Weeks of Breastfeeding ^b	8 (4, 24)	15 (5, 24)	0.25

BMI, body mass index

^aData are means ± SD, p-value based on t-test^bData are median (IQR), p-value based on Mann Whitney U test^cData are n (%), p-value based on χ^2 or Fisher's exact test

Table 2.

Cardiometabolic Variables at baseline and 12-months postpartum in Standard PAT and PAT+Lifestyle Groups

	Standard PAT (n=93)		PAT+Lifestyle (n=92)		p-value ^a
	Baseline	12-months Postpartum	Baseline	12-months Postpartum	
SBP (mmHg)	110.9 ± 10.9	118.6 ± 12.8	119.1 ± 10.4	115.1 ± 10.7	0.80
DBP (mmHg)	67.3 ± 8.3	71.7 ± 10.1	67.2 ± 8.8	72.4 ± 10.7	0.63
Glucose (mg/dL)	81.0 ± 6.2	88.2 ± 7.8	89.4 ± 7.6	89.4 ± 7.5	0.34
Insulin (uU/mL)	11.8 ± 7.6	15.0 ± 9.6	13.4 ± 7.7	17.2 ± 10.4	0.41
HOMA-IR	2.41 ± 1.7	3.29 ± 2.3	2.76 ± 1.8	3.88 ± 2.6	0.33
Glucose AUC (mg/dL x 120 min)	15341 ± 2134	15817 ± 2043	15179 ± 1747	16021 ± 2235	0.26
Insulin AUC (uU/dL x 120 min)	13787 ± 8669	13048.2 ± 8249	14744 ± 7622	13417 ± 7779	0.85
OGIS	399 ± 69	376 ± 66	391 ± 68	367 ± 64	0.56
Cholesterol (mg/dL)	161.0 ± 31.9	144.6 ± 29.6	161.1 ± 30.9	146.0 ± 27.2	0.68
LDL-cholesterol (mg/dL)	81.5 ± 25.0	85.9 ± 24.1	83.6 ± 25.4	88.0 ± 24.1	0.84
Triglycerides (mg/dL)	84.0 ± 37.5	62.0 ± 34.7	81.9 ± 26.8	62.3 ± 29.9	0.85
HDL-cholesterol (mg/dL)	62.6 ± 13.9	46.3 ± 11.8	61.1 ± 11.2	46.2 ± 11.0	0.56

Data are means ± SD

SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; LDL: Low-density-lipoprotein Cholesterol; HDL: High-density-Lipoprotein Cholesterol; HOMA-IR: Homeostatic Model Assessment for Insulin Resistance; AUC: Area under the Curve; OGIS: Oral Glucose Insulin Sensitivity

^aSignificance of difference between intervention groups in the change in measures obtained at baseline and 12-month postpartum, p-value based on ANCOVA