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Self-efficacy, social support, and associations with physical activity and body mass index among women with histories of gestational diabetes mellitus

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Abstract

Purpose—To examine the associations between 2 potential facilitators of healthy behaviors (self-efficacy and social support), and both physical activity and body mass index (BMI) among women with histories of gestational diabetes mellitus (GDM)

Methods—We surveyed 228 women with histories of GDM enrolled in a managed care plan. In a cross-sectional analysis, we assessed the association between women's social support from family and friends for physical activity and self-efficacy for physical activity with women's physical activity levels. We also examined the association between women's social support from family and friends for healthy diet and self-efficacy for not overeating and their dietary habits. Finally, we assessed the association between all of these psychosocial constructs and body mass index (BMI) before and after adjustment for covariates.

Results—Participants reported low to moderate social support and self-efficacy scores, suboptimal performance of physical activity, suboptimal dietary scores, and high BMIs. Self-efficacy and social support from family and friends for physical activity were associated with physical activity. Social support from family and friends for a healthy diet was associated with

better dietary scores and the association between self-efficacy for not overeating and healthy diet bordered on significance. No significant associations existed between psychosocial constructs and BMI.

Conclusions—Psychosocial constructs such as social support and self-efficacy are associated with physical activity and dietary habits. However, associations with BMI are weak. Further exploration of constructs associated with BMI may be needed to design effective weight-loss interventions in this population.

In the Diabetes Prevention Program (DPP), participants randomized to intensive lifestyle intervention, with the goals of maintaining physical activity levels over 150 minutes per week and losing 7% of their body weight, had a lower incidence of diabetes.¹ These findings extended to participants with histories of gestational diabetes (GDM) as well (R. Ratner, personal communication). The goal of behavioral intervention is to influence psychosocial mediators of health behaviors in order to enact the desired behavior changes. Several behavioral theories, particularly the Theory of Reasoned Action and Planned Behavior and Social Cognitive Theory,² posit that confidence to perform a task (otherwise known as self-efficacy) and the available social support for that task can be key mediators and moderators of lifestyle behaviors. For example, in the DPP, self-efficacy for physical activity was associated with greater performance of physical activity³ and self-efficacy for not overeating was associated with lower baseline body mass index (BMI).⁴ In another randomized study, overweight women enrolled in a behavioral weight-loss intervention program reported greater use of behavioral strategies to elicit social support for weight loss and physical activity; these women had greater than 10% weight loss and increased physical activity more frequently than controls.⁵

For several reasons, it is unclear whether interventions focused on self-efficacy and social support would be effective among women with histories of GDM. First, glucose intolerance resolves with delivery in about 90% of women with GDM,⁶ so women may not perceive lifestyle modification as necessary. Second, women with recent GDM tend to be younger than DPP participants, and may therefore face different barriers to lifestyle modification, such as the presence of young children,⁷ that may negate the potential benefit of focusing on the psychosocial determinants of their health behaviors. Third, studies of psychosocial factors in women with recent histories of GDM are few. In one report from Australia, 2/3 of women reported suboptimal physical activity levels, and both greater social support and self-efficacy for physical activity were associated with greater physical activity.⁸ In another small survey of twenty-eight women with recent histories of GDM, Symons-Downs and Ulbrecht found that social support from the partner was the strongest influence upon exercise, exceeding the influence of healthcare providers.⁹ To our knowledge, no studies have examined the role of self-efficacy or social support for other behaviors, such as not overeating, upon other outcomes, such as BMI, among women with recent histories of GDM.

Therefore, using previously validated measures of self-efficacy and social support, we examined the cross-sectional associations between self-efficacy and social support for lifestyle behaviors and performance of these behaviors among women with recent histories

of GDM. We hypothesized that women who reported greater self-efficacy and social support for physical activity would be associated with greater activity, and women who reported greater self-efficacy and social support for not overeating would report healthier diets. We also hypothesized that self-efficacy and social support for physical activity and not overeating would be associated with lower BMI, and mediated through the behaviors of diet and activity.

Research Design and Methods

Study participants were women enrolled in a university-affiliated managed care plan and identified as having had a GDM pregnancy within the past 5 years through a GDM delivery code (ICD-9 code 648.8) or outpatient diagnostic code 648.83 (undelivered) or 648.84 (delivered) and with at least one health-care utilization event during the year before the survey. Women were contacted using a computer-assisted telephone algorithm. Women were excluded if they stated they had type 1 or type 2 diabetes before their pregnancy, denied having had GDM, were currently pregnant with the index pregnancy (although they were eligible if they were currently pregnant and had already completed another GDM pregnancy), or were unable to give informed consent. Four-hundred and eight women were initially identified by claims data. A total of 30 women were ineligible, six because they had type 1 or type 2 diabetes before their pregnancy, 23 because they denied having GDM, and one because she was currently pregnant with her first GDM pregnancy. Four eligible women refused to participate or did not complete an entire survey, and 146 could not be contacted. Of known eligible respondents, the response rate was 98%. If individuals who we were unable to contact had the same rate of eligibility as those contacted and were counted in the denominator, the survey response rate was 65%.¹⁰ Surveys were completed by 228 women, with 135 consenting to telephone interviews and 92 opting to complete written surveys. Survey responders were similar to non-responders in terms of years of age (36 ± 5 vs. 36 ± 5 , $p=0.16$), months since delivery (32 ± 18 vs. 30 ± 17 , $p=0.17$), and visits in the year following their GDM delivery (11 ± 11 vs. 10 ± 10 , $p=0.34$).

Self-efficacy and social support (independent variables)

Self-efficacy for physical activity was measured using the 5-item scale developed by Marcus and colleagues.¹¹ This scale has adequate internal consistency, test re-test reliability, and concurrent validity, with a Cronbach's α in our sample of 0.71. In the current study, respondents rated their level of confidence (very confident to not at all confident) on a 5-point scale, for a range of 5–25. Self-efficacy for not overeating was assessed using the Weight Efficacy Lifestyle Questionnaire, which had a Cronbach's α in our sample of 0.93.¹² This 20-item instrument assesses respondents' confidence in resisting overeating in various situations. In the current study, participants rated their confidence in each situation (ranging from very often to never) on a 5-point scale, for a range of 20–100. Social support for exercise and social support for a healthy diet were assessed with revised versions of scales developed by Sallis and colleagues.¹³ We dropped the negatively worded items from the dietary support scale and the "sabotage" items from the dietary support-family scale because neither sets of items were correlated with dietary measures in Sallis' and colleagues' report.¹³ We also dropped the "rewards and punishment" scale from the exercise support-

family scale as these were not highly correlated with exercise in Sallis' report.¹³ In our sample, the Cronbach's α for these modified scales demonstrated high reliability, with social support for physical activity from friends = 0.89 (range of possible scores 5–25), social support for physical activity from family = 0.91 (range of possible scores 12–60), social support for healthy diet from family = 0.87 (range of possible scores 6–30), and social support for a healthy diet from friends = 0.89 (range of possible scores 6–30).

Dependent variables

Physical activity—Self-reported physical activity was assessed using several measures. First, using a measure from the National Health Interview Survey,¹⁴ we asked women: how often they had walked for exercise, the average number of hours they spent walking each time they did walk, and how much their heart and breathing rates increased (i.e. no increase, small, medium, or large) while walking. We then calculated the total number of hours per week that women spent walking. Number of hours per week was categorized as 1, 2, 3, 4. We also examined walking intensity, stratified by duration (no walking, walking with no increase in heart rate, small increase, medium increase, or large increase in heart rate).¹⁴ We also assessed degree of exertion during leisure-time activity using a single-item question, adapted from the MONICA physical activity instrument,¹⁵ and validated in Project DIRECT (Diabetes Intervention Reaching and Educating Communities Together).¹⁶ Women were asked which of the following 4 physical activity levels best described their present leisure-time activity: none, only light physical activity in most weeks, vigorous activity for at least 20 minutes once or twice per week, and vigorous activity for at least 20 minutes 3 or more times per week.

Dietary habits and body mass index—We measured dietary quality using the Michigan Healthy Diet Indicator (HDI), an adaptation of the Healthy Eating Index adapted and validated specifically for telephone interviews.¹⁷ This index consists of 16 questions that assess intake of grains, vegetables, fruits, meats, milk, total fat, saturated fat, cholesterol, sodium, and the variety of foods. Greater scores indicate greater dietary quality, with a maximum score of 100. For the purposes of our analysis, we examined quartiles of scores. BMI was obtained from self-report and was calculated in standard fashion as kilograms divided by height in meters squared. Height is generally overestimated by an average of 0.5 inches; men have a greater tendency to overestimate height than women. In population-based surveys that examined the correlation between measured anthropometrics vs. self-reported anthropometrics, the correlation between measured height and self-reported height was 0.92 in women. Similarly, weight is generally underestimated; women aged 20–29 years of age have a greater tendency to underestimate weight than other groups. In population-based surveys, the correlation between measured weight and self-reported weight exceeded 0.90.¹⁸

Statistical Analysis

First, we used analysis of variance to examine the unadjusted association between psychosocial factors and participant characteristics (Table 1), as well as between psychosocial factors and the main outcome measures. Participant characteristics included demographic variables (age, race, education, and income), current smoking, breast-feeding,

insulin use during pregnancy, number of months elapsed since the GDM pregnancy, and type of prenatal care provider. We reasoned that exposure to specific types of prenatal care providers, such as dietitians, might be associated with greater levels of psychosocial constructs, such as self-efficacy for not overeating. Women could have multiple provider types during pregnancy, so prenatal provider type was characterized using multiple binary variables: contact with an obstetrician/gynecologist (yes/no), family practitioner (yes/no), endocrinologist (yes/no), midwife (yes/no), dietitian (yes/no), and other provider type (yes/no).

Next, to determine if psychosocial factors were associated with relevant dependent measures beyond their association with participant characteristics, we constructed several multivariable regression models. The first set of models used logistic regression with each measure of physical activity performance as the dependent variable; a separate model was constructed for number of hours per week spent walking, perceived walking intensity, and degree of exertion during leisure time physical activity. Primary independent variables included self-efficacy for physical activity and social support from family and from friends for physical activity. The second set of models used logistic regression with quartiles of HDI score as the dependent variable. The primary independent variables included self-efficacy for not overeating and social support from family and from friends for a healthy diet. The third set of models used linear regression with BMI as the dependent variable. The primary independent variables included self-efficacy and social support from family and from friends for physical activity, and self-efficacy for not overeating and social support from family and from friends for a healthy diet. Finally, as we postulated that the relationship between psychosocial constructs with BMI was mediated by physical activity and not overeating, we then constructed multivariable regression models then included measures of physical activity and the HDI score.

Covariates for all the multivariate models were included based on significant bivariate association ($p < 0.05$) with either the primary independent variable or with the outcome measure and are illustrated in Table 2. Continuous variables such as age and months at delivery are displayed as tertiles in Table 1 but were included in the models as continuous variables. Covariates did not correlate highly ($r > 0.6$) and therefore none were excluded on this basis. In sensitivity analyses, BMI was also examined as a categorical variable (< 25 kg/m², 25–29.9 kg/m², ≥ 30 kg/m²). We also substituted prepregnancy BMI and weight gain over pregnancy as dependent variables instead of current BMI. Results from those auxiliary analyses were similar to those presented here and are not shown. Analyses were conducted with SAS Version 9.0 software.

Results

As shown in Table 1, participants were generally non-Hispanic white, affluent, and well-educated. While most women reported breast-feeding, only about one-third did so for greater than 3 months without formula supplementation. Most respondents had received prenatal care from an obstetrician during pregnancy, with lower percentages also reporting care by an endocrinologist or dietitian. About 44% reported insulin use during pregnancy and three-quarters had delivered within the past 3 years.

Possible ranges in scores for psychosocial constructs are illustrated in Table 1. Overall, women reported low self-efficacy (mean score $13.3 \pm \text{SD } 4.2$) and moderate social support (family 28.5 ± 10.6 , friends 9.9 ± 4.9) for physical activity. Women also reported low self-efficacy for not overeating (62.5 ± 18.5) and moderate social support for a healthy diet (family 13.4 ± 5.5 , friends 10.6 ± 4.6). Self-efficacy for physical activity was positively associated with education, prenatal contact with a dietitian, and negatively associated with smoking (Table 1). Social support for physical activity from friends was associated only with midwife contact during pregnancy. Social support for physical activity from family was lower among non-Hispanic white women, and higher with prenatal dietitian contact. Self-efficacy for not overeating was positively associated with dietitian contact. Social support for a healthy diet from both friends and family was not associated with participant characteristics.

Women reported suboptimal physical activity levels, with less than one-third reporting vigorous activity for 20 minutes at least 3 times a week (Table 2). In unadjusted analyses, self-efficacy and social support were each positively associated with measures of physical activity, although the pattern of associations varied depending on the physical activity measure examined. Greater self-efficacy physical activity scores and social support for physical activity from friends were associated with a greater number of hours spent walking and greater leisure time vigorous activity, although not with walking intensity. Social support for physical activity from family, in contrast, was associated with greater leisure time physical activity, but not with the total number of hours spent walking. Unexpectedly, greater social support was associated with a lower walking intensity.

Women reported suboptimal dietary habits as reflected in low HDI scores (Table 2). In unadjusted analyses, self-efficacy for not overeating was associated with better dietary quality. Greater social support from family and friends for a healthy diet correlated with better dietary quality with a trend towards, but not meeting, statistical significance.

After adjustment for covariates (Table 3), greater self-efficacy for physical activity was associated with greater than 4 hours per week spent walking and with performance of vigorous activity for at least 20 minutes 3 times a week. Stronger social support for physical activity from friends was also associated with greater than 4 hours spent walking per week, but associations between friends' social support and leisure time activity were no longer significant. After adjustment, social support for physical activity from family was associated with performance of vigorous activity for at least 20 minutes compared to minimal activity, although no association with walking was seen. After adjustment for covariates (Table 3), self-efficacy for not overeating was not significantly associated with dietary quality, although the association just missed significance ($p=0.06$). Stronger social support for dietary habits from family and friends was associated with better dietary quality.

In analyses using BMI as the outcome, we found that most respondents were obese, with a current mean BMI of $30.3 \pm 7.7 \text{ kg/m}^2$. In unadjusted analyses, we did not find significant associations between psychosocial constructs for physical activity and BMI, including physical activity-related self-efficacy (regression coefficient -0.23 , 95% CI $-0.47, 0.004$), social support for physical activity from friends (regression coefficient -0.05 , 95% CI

−0.26, 0.16), and social support for physical activity from family (regression coefficient −0.02, 95% CI −0.12, 0.07). After adjustment for leisure time activity, the associations between psychosocial constructs and BMI still remained non-significant.

Neither did we find significant associations between psychosocial constructs for diet and BMI, including self-efficacy for not overeating (regression coefficient −0.01, 95% CI −0.06, 0.05) and social support for diet from family (regression coefficient 0.17 (95% CI −0.01, 0.36), with the exception of a weak correlation between friends' social support for diet and BMI (regression coefficient 0.23, 95% CI 0.01, 0.46). After adjustment for the HDI score, no dietary psychosocial constructs were associated with BMI.

Discussion

In this sample of women with recent histories of GDM, we found that self-efficacy and social support for physical activity were associated with several measures of performance of physical activity. We also found that self-efficacy and social support for a healthy diet were associated with a dietary quality score. However, we did not find that self-efficacy or social support for either physical activity or diet correlated with women's BMIs before or after inclusion of mediators of physical activity or diet. This is unfortunate, given that in the DPP, reduction of diabetes risk was mediated primarily through weight loss and not physical activity; in other words, physical activity had little independent effect upon diabetes risk after accounting for weight loss.¹ Because they were highly educated and relatively affluent, our sample may represent a "best-case" scenario, with greater opportunities to improve physical activity and BMI. Unfortunately, we found that even in this sample, less than a third engaged in optimal physical activity or diet and most were overweight or obese.

In contrast to our findings, the DPP found that in cross-sectional analyses of their baseline data that self-efficacy for not overeating and exercise self-efficacy were significantly correlated with BMI.³ There are several possible reasons for the differences in our results. As opposed to our study participants, women in the DPP averaged over 50 years of age and were of more varied racial and ethnic backgrounds. They were also significantly more obese, with approximately 2/3 reporting BMI ≥ 30 kg/m². Perhaps most importantly, DPP participants had already agreed to participate in an intervention to reduce their diabetes risk and may have had greater motivation than the women in our sample, who had young children at home and who were not participants in a randomized intervention trial. On average, the scores reported for self-efficacy were higher among DPP participants than in our sample. In addition, women in our sample may not have perceived increased risk for diabetes and the urgency to lose weight or to increase physical activity.

We did find that self-efficacy and social support measures for physical activity were valid in our sample in that they correlated with self-reported physical activity. In this respect, our findings were similar to those of the DPP.³ We also found that levels of support and self-efficacy for activity were only low to moderate. An Australian study also found that women with recent histories of GDM had low self-efficacy in common situations, such as when they were tired or felt they lacked time.⁸ We also found that self-efficacy and social support measures for dietary habits were valid in our sample in that they correlated with an index of

dietary quality, levels of support and self-efficacy for diet were only low to moderate, and these constructs correlated with dietary quality. To our knowledge, these constructs have not been examined in other GDM populations, but are consistent with what was observed in the DPP.⁴

Other psychosocial factors that we did not measure may have a greater impact on BMI. For example, perceived stress correlated with BMI in the DPP.³ The Women and Infants Staying Healthy (WISH) study, a cohort of urban, racially and ethnically diverse pregnant women,¹⁹ reported a possible role for perceived stress upon BMI. In addition, behaviors unique to the recent gravida may have a greater effect on BMI and glucose tolerance than these psychosocial constructs. Breastfeeding without formula supplementation has been associated with both weight loss and incidence of diabetes, independent of weight loss,²⁰ although we did not find a significant correlation in our population.

Our report has several limitations. First, our cohort is atypical of the U.S. population in that we drew from a sample of relatively highly educated and affluent non-Hispanic white women. In WISH, 23% of women with GDM had less than a high school education,¹⁹ compared to the < 1% in our sample. In the Behavioral Risk Factor Surveillance System, 16% of U.S. women with histories of GDM had less than a high school education, and 27% had only a high school education, and Latinas were disproportionately represented.⁷ Moreover, our ascertainment of physical activity and BMI were limited to self-report, which may have biased the significance of the association, although the direction of the bias is difficult to predict. Finally, our study was cross-sectional, and thus we cannot conclude that changes in the psychosocial factors for physical activity led to the performance of physical activity.

We conclude that self-efficacy and social support for lifestyle behaviors are associated with lifestyle behaviors among women with histories of GDM, but the association with BMI are not as strong. While programs that target increases in physical activity through the building and enforcement of self-efficacy and social support for physical activity may be promising, such skills may not be as effective for reductions in postpartum BMI. Further exploration of the determinants of BMI among this recently pregnant group should be explored in order to design effective weight management counseling. Potential avenues include the performance of breast-feeding and risk perception for future glucose intolerance. Longitudinal assessments of constructs associated with behavior would inform the design future randomized studies, as well as risk stratification of those who might succeed in interventions to modify lifestyle.

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Table 1

Participant characteristics, self-efficacy and social support for physical activity, self-efficacy for not overeating, and social support for a healthy diet. Mean scores and standard deviations shown. Significant associations ($p < 0.05$) are in bold type.

Total	Self-efficacy for physical activity	Social support for physical activity, friends	Social support for physical activity, family	Self-efficacy for not overeating	Social support for diet, friends	Social support for diet, family
	range 5–25 N=226	range 5–25 N=227	range 12–60 N = 226	range 20–100 N = 226	range 6–30 N = 225	range 6–30 N = 225
Age, tertiles (years)						
< 34 years	13.6 ± 4.5	9.6 ± 4.9	28.7 ± 12.5	63.2 ± 20.1	10.7 ± 5.2	14.2 ± 6.4
34–38 years	12.9 ± 3.8	9.6 ± 4.2	26.4 ± 9.1	59.8 ± 18.1	10.6 ± 4.5	12.7 ± 5.0
> 38 years	13.3 ± 4.5	10.7 ± 5.2	30.4 ± 9.6	64.6 ± 17.1	10.5 ± 4.1	13.5 ± 5.0
Race						
Non-Hispanic white	13.3 ± 4.2	9.3 ± 4.6	27.2 ± 9.7	62.6 ± 18.4	10.5 ± 4.6	12.8 ± 5.1
Hispanic	14.1 ± 5.5	10.5 ± 6.3	33.4 ± 12.6	57.3 ± 21.7	11.1 ± 5.6	17.6 ± 7.2
Asian/Pacific Islander	12.2 ± 4.0	11.6 ± 5.0	31.9 ± 10.2	61.4 ± 17.1	10.7 ± 4.2	14.4 ± 5.3
African-American	13.7 ± 3.5	11.6 ± 5.4	27.7 ± 14.8	59.8 ± 22.8	10.8 ± 5.2	14.0 ± 7.8
Native American	14.7 ± 5.7	12.7 ± 5.1	37.5 ± 11.7	75.5 ± 16.9	13.2 ± 5.0	14.8 ± 6.5
Other	10.5 ± 4.1	9.0 ± 3.2	21.8 ± 9.9	64.8 ± 16.1	11.3 ± 4.6	14.3 ± 5.6
Education						
< High school degree	5.00 ± 0.0	16.0 ± 0.0	23.0 ± 0.0	54.0 ± 0.0	6.0 ± 0.0	12.0 ± 0.0
High school graduate	11.1 ± 3.7	9.4 ± 5.3	25.8 ± 12.8	60.0 ± 19.1	11.4 ± 7.5	14.5 ± 8.0
Some college	12.8 v 4.2	9.4 ± 4.9	26.4 ± 10.3	60.2 ± 19.7	10.3 ± 4.5	13.1 ± 5.8
College graduate	13.8 ± 4.2	10.2 ± 4.8	29.6 ± 10.3	63.8 ± 18.0	10.7 ± 4.3	13.4 ± 5.1
Annual income						
<\$15,000 per year	12.0 ± 5.9	10.1 ± 7.1	23.4 ± 13.1	69.8 ± 18.5	10.4 ± 6.9	10.8 ± 5.6
\$15,000–<\$40,000	12.5 ± 4.0	9.7 ± 5.2	26.6 ± 12.1	59.2 ± 22.2	11.1 ± 5.1	14.2 ± 7.1
\$40,000 – <\$75,000	13.1 ± 4.4	9.1 ± 4.1	28.4 ± 11.3	60.3 ± 17.8	10.9 ± 4.6	13.6 ± 5.4
\$75,000	13.7 ± 4.0	10.2 ± 5.0	29.0 ± 9.2	64.1 ± 18.3	10.1 ± 4.0	13.1 ± 4.9
Current cigarette smokers	11.7 ± 4.8	10.2 ± 5.1	26.7 ± 11.5	62.7 ± 20.7	11.0 ± 5.7	12.6 ± 5.7
Duration of breast feeding without formula						

Total	Self-efficacy for physical activity	Social support for physical activity, friends	Social support for physical activity, family	Self-efficacy for not overeating	Social support for diet, friends	Social support for diet, family
	range 5–25	range 5–25	range 12–60	range 20–100	range 6–30	range 6–30
	N=226	N=227	N = 226	N = 226	N = 225	N = 225
None or < 3 months	13.4 ± 4.4	10.0 ± 4.9	28.3 ± 10.9	61.3 ± 19.3	11.2 ± 4.8	14.0 ± 5.7
3 months – < 1 year	13.0 ± 3.8	10.3 ± 4.8	29.3 ± 10.3	64.1 ± 17.9	10.5 ± 4.8	12.8 ± 5.6
> 1 year or more	13.9 ± 4.5	9.4 ± 5.2	28.0 ± 10.4	62.8 ± 16.8	9.2 ± 3.4	12.7 ± 4.8
Number of months since delivery, tertiles						
< 15 months	12.7 ± 4.3	9.4 ± 5.0	28.4 ± 11.7	65.1 ± 19.5	10.4 ± 4.6	13.6 ± 5.5
15–33 months	13.1 ± 4.2	10.2 ± 4.9	28.4 ± 10.5	60.1 ± 17.9	11.2 ± 4.7	13.5 ± 5.3
> 33 months	13.8 ± 4.0	10.2 ± 4.7	28.5 ± 9.9	62.1 ± 18.0	10.4 ± 4.5	13.3 ± 5.9
Prenatal provider type*						
Obstetrician	13.2 ± 4.2	10.1 ± 4.9	28.6 ± 10.5	61.9 ± 18.5	10.7 ± 4.7	13.6 ± 5.5
Family practitioner	14.8 ± 5.2	9.4 ± 4.7	29.4 ± 13.1	66.5 ± 21.4	9.8 ± 4.6	13.1 ± 6.2
Endocrinologist	13.5 ± 4.2	10.0 ± 5.1	29.7 ± 10.4	63.5 ± 17.3	10.6 ± 4.5	13.5 ± 5.0
Midwife	12.5 ± 3.3	7.2 ± 3.0	26.1 ± 6.9	66.3 ± 14.8	9.9 ± 4.8	11.3 ± 5.3
Dietician	13.8 ± 4.5	10.3 ± 5.0	30.0 ± 10.5	65.6 ± 17.9	10.9 ± 4.3	13.7 ± 5.2
Other	15.1 ± 4.4	9.6 ± 5.1	30.1 ± 12.9	75.5 ± 16.2	9.3 ± 4.6	12.2 ± 5.0
Insulin use during pregnancy (yes/no)	13.0 ± 4.4	9.9 ± 4.9	28.5 ± 9.7	63.7 ± 18.8	10.4 ± 4.2	13.5 ± 4.8

* Women could see multiple provider types during pregnancy, so percentages do not sum to 100.

Table 2

Unadjusted self-efficacy scores and social support scores for physical activity and by category of physical activity. Means scores and standard deviations shown. Significant associations ($p < 0.05$) are in bold type.

	<u>Total</u>	<u>Self-efficacy for physical activity</u>	<u>Social support for physical activity, friends</u>	<u>Social support for physical activity, family</u>
		range 5–25	range 5–25	range 12–60
Number of hours spent walking				
0–1 hours	21%	11.6 ± 4.4	8.1 ± 3.4	26.0 ± 10.4
2 hours	21%	13.0 ± 4.1	11.2 ± 5.3	28.4 ± 9.4
3 hours	21%	13.6 ± 3.3	9.0 ± 4.3	29.5 ± 9.8
4 hours	37%	14.7 ± 4.6	11.1 ± 5.4	30.2 ± 11.9
Perceived walking intensity				
No walking	4%	12.6 ± 6.9	9.3 ± 4.8	32.5 ± 15.1
Walking, no ↑ in heart rate	8%	11.4 ± 4.0	6.7 ± 2.8	20.7 ± 11.4
Walking with small ↑ in heart rate	42%	13.1 ± 4.0	10.0 ± 4.6	28.9 ± 10.2
Walking with medium ↑ in heart rate	37%	14.2 ± 4.2	10.2 ± 5.1	30.0 ± 10.3
Walking with large ↑ in heart rate	9%	14.9 ± 4.4	11.4 ± 6.0	28.6 ± 9.8
Leisure time vigorous physical activity				
No physical activity	4%	10.7 ± 3.3	8.5 ± 3.6	18.8 ± 7.9
Only light physical activity	42%	11.6 ± 3.4	8.5 ± 4.1	25.8 ± 9.6
Vigorous activity for 20 minutes, 1–2 times per week	22%	14.1 ± 4.0	10.6 ± 4.6	27.4 ± 8.8
Vigorous activity for 20 minutes, 3 times per week	31%	15.3 ± 4.5	11.5 ± 5.5	34.0 ± 10.9

	<u>Total</u>	<u>Self-efficacy for not overeating</u>	<u>Social support for a healthy diet, friends</u>	<u>Social support for a healthy diet, family</u>
Healthy Dietary Index				
Quartile 1 (< 45)	24%	61.4 ± 16.3	9.8 ± 4.5	12.0 ± 5.1
Quartile 2 (45 to < 55)	24%	61.9 ± 19.7	9.9 ± 4.2	12.9 ± 5.4
Quartile 3 (55 to < 64)	27%	58.2 ± 17.6	11.7 ± 5.0	14.0 ± 5.5
Quartile 4 (> 64)	25%	69.8 ± 17.8	10.9 ± 4.3	14.6 ± 5.7

Table 3

Association between self-efficacy and social support for physical activity and physical activity, and self-efficacy and social support for not overeating and diet, adjusted for patient characteristics. * Odds ratios and 95% confidence intervals shown.

	<u>Self-efficacy for physical activity</u>	<u>Social support for physical activity, friends</u>	<u>Social support for physical activity, family</u>
Number of hours spent walking over one week, reference = 0–1 hours			
2 hours	1.10 (0.98–1.25)	1.16 (1.04–1.30)	1.03 (0.98–1.08)
3 hours	1.13 (1.00–1.28)	1.07 (0.95–1.21)	1.05 (1.00–1.11)
4 hours	1.21 (1.08–1.36)	1.16 (1.04–1.30)	1.05 (1.00–1.10)
Perceived walking intensity, reference = no walking			
Walking, no increase in heart rate	1.00 (0.78–1.29)	0.84 (0.62–1.14)	0.91 (0.80–1.03)
Walking with small increase in heart rate	1.09 (0.88–1.36)	1.06 (0.86–1.32)	1.01 (0.92–1.11)
Walking with medium increase in heart rate	1.15 (0.93–1.44)	1.09 (0.87–1.35)	1.03 (0.94–1.13)
Walking with large increase in heart rate	1.21 (0.94–1.56)	1.11 (0.88–1.41)	0.98 (0.88–1.08)
Leisure time vigorous physical activity, reference = no physical activity			
Only light physical activity	1.08 (0.83–1.40)	1.02 (0.82–1.27)	1.09 (0.97–1.23)
Vigorous activity for 20 minutes, 1–2 times per week	1.28 (0.98–1.68)	1.16 (0.93–1.45)	1.11 (0.99–1.26)
Vigorous activity for 20 minutes, 3 times per week	1.40 (1.07–1.83)	1.18 (0.94–1.47)	1.19 (1.05–1.34)
	<u>Self-efficacy for not overeating</u>	<u>Social support for diet, friends</u>	<u>Social support for diet, family</u>
Healthy Dietary Index, reference = lowest quartile			
Quartile 2	1.00 (0.98–1.02)	1.01 (0.92–1.11)	1.04 (0.96–1.13)
Quartile 3	0.99 (0.97–1.01)	1.10 (1.01–1.19)	1.08 (1.00–1.17)
Quartile 4	1.02 (1.00–1.05)	1.06 (0.96–1.16)	1.10 (1.02–1.19)

* Physical activity models adjusted for age, race, education, current smoking, prenatal provider type, months since delivery.

Healthy Dietary Index models adjusted for age, education, dietitian, and prenatal provider type. Significant associations ($p < 0.05$) are in bold type.