



## Influences of prior miscarriage and weight status on perinatal psychological well-being, exercise motivation and behavior

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### ABSTRACT

**Objectives:** women who have experienced miscarriage may be at increased risk for elevated depressive and anxiety symptoms in subsequent pregnancies. Exercise may be a useful strategy for coping with these symptoms. Little is known about how miscarriage influences prenatal exercise behavior. The study purpose was to examine the influences of miscarriage history and prepregnancy weight status on pregnant women's psychological health, exercise motivation, and behavior using the Theory of Planned Behavior.

**Participants/Setting:** Pregnant women (N=203; 41 with prior miscarriage; 72 overweight/obese; BMI > 25.0) in the northeast United States.

**Design:** Women prospectively reported their depressive/anxiety symptoms and exercise motivation/behavior in the 1st, 2nd, and 3rd trimesters via mailed surveys. Group differences in depressive/anxiety symptoms, exercise behavior, and its motivational determinants were examined using Chi Square analyses and Univariate and Multivariate Analyses of Covariance.

**Measurements and findings:** Women with a history of miscarriage had higher 1st and 2nd trimester depressive/anxiety symptoms and lower 1st trimester attitudes about exercise and 1st and 2nd trimester perceived behavior control than women without a history of miscarriage. Overweight/obese women had higher 1st and 2nd trimester pregnancy depressive/anxiety symptoms, engaged in less prepregnancy exercise, and had lower levels of exercise intention, attitude, and perceived behavior control throughout pregnancy than normal weight women.

**Key Conclusions:** Women with a history of miscarriage and overweight/obese women have poorer psychological health and lower motivation to exercise during pregnancy than women without a history of miscarriage and normal weight women.

**Implications for practitioners:** Interventions and healthcare provider communications aimed at promoting perinatal exercise behavior and psychological health should take into account pre-pregnancy weight status and pregnancy history to identify strategies to help women, particularly overweight/obese women with a history of miscarriage, to overcome exercise barriers.

### Introduction

Miscarriage (i.e., spontaneous perinatal loss < 20 weeks gestation) is the most common complication of early pregnancy and occurs in approximately 24% of pregnancies (American College of Obstetricians and Gynecologists [ACOG], 2013; Jurkovic et al., 2013; Larsen et al., 2013). A miscarriage can be especially traumatic; it is associated with significant psychological distress (i.e., elevated levels of depressive/anxiety symptoms) that may persist during a subsequent pregnancy

and postpartum (ACOG, 2013; Jurkovic et al., 2013; Robinson, 2014). This is particularly concerning for overweight and obese (OW/OB) women (i.e., BMI > 25.0) who are at elevated risk for miscarriage and have a higher prevalence of perinatal and postpartum mental disorders than normal weight women, independent of pregnancy history (Lashen et al., 2004; Molyneaux et al., 2014). Engaging in regular exercise behavior may be one non-pharmacological strategy to reduce perinatal symptoms of depression and anxiety (Da Costa et al., 2003).

Exercise has positive mental and physical benefits for pregnant

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**Table 1**  
Demographic Characteristics of the Study Sample (Percentages) and Group Differences in Categorical Variables.

	Total Sample % (N = 203) <sup>a</sup>	Normal Weight		Overweight/Obese		PPWS Group Differences			PL Group Differences		
		No Miscarriage % (N = 96)	Miscarriage % (N = 20)	No Miscarriage % (N = 49)	Miscarriage % (N = 17)	$\chi^2$	df	p	$\chi^2$	df	p
Prepregnancy											
Weight Status											
Underweight	4%										
Normal Weight	60%										
Overweight	40%										
Obese	16%										
Pregnancy History											
Previous	20%										
Miscarriage											
No Previous	80%										
Miscarriage											
Marital Status						6.18	4	0.19	2.74	4	0.59
Married	95.5	98.0	100.0	94.3	84.2						
Single	2.9	1.0	0.0	3.8	10.5						
Divorced	0.5%	0.0	0.0	1.9	0.0						
Other	1.0%	1.0	0.0	0.0	5.3						
Race/Ethnicity						7.14	3	0.07	5.07	3	0.17
Caucasian	92.6	92.2	85.7	98.1	94.7						
Asian	4.4	4.9	9.5	0.0	0.0						
Hispanic	1.5	0.0	4.8	1.9	5.3						
Other	1.5	2.9	0.0	0.0	0.0						
Education						4.92	3	0.18	2.13	3	0.55
Graduate	46.8	50.0	45.0	43.4	31.6						
College	49.3	47.1	55.0	49.1	63.2						
High School	2.5	1.0	0.0	5.7	5.3						
Other	1.5	2.0	0.0	1.9	0.0						
Family Income						6.74	5	0.24	4.93	5	0.43
> \$100,000	24	29.6	20.0	13.2	15.8						
\$40,000 – 100,000	55.6	51	70.0	58.8	73.7						
\$20,000 – 39,999	14.8	15.3	10.0	20.8	5.3						
\$10,000 – 19,999	3.6	3.1	0.0	3.9	5.3						
< \$10,000	1.5	1	0.0	1.9	0.0						
Pregnancy History						0.10	1	0.92	0.76	1	0.78
No Full Term	36.3	37.9	31.8	34.0	47.4						
Births											
1+ Full term Births	63.7	62.1	68.2	66.0	52.6						

<sup>a</sup> Note. Study sample includes all participants including underweight (n = 7) and exercise-restricted women (n = 15); PPWS = Prepregnancy Weight Status; PL = Perinatal Loss.

women and their offspring (Symons Downs et al., 2012; U.S. Department of Health and Human Services [USDHHS], 2008). Exercise promotes the viability of a pregnancy, improves fertility rates and perinatal outcomes, and reduces miscarriage rates in obese women with a history of reproductive complications (Clark et al., 1998; Ferreira et al., 2010). Active pregnant women also report lower depressive/anxiety symptoms than sedentary pregnant women (Da Costa et al., 2003). The exercise recommendations suggest that pregnant women participate in 150 minutes of moderate to vigorous exercise weekly (i.e., exertion equal to or greater than a brisk walk for 30 minutes, 5 times a week; USDHHS, 2008) for women without obstetric or medical complications or contraindications (e.g., placenta previa, preterm labor) to exercise (Artal and O'Toole, 2003; USDHHS, 2008). However, only 23% of pregnant women are sufficiently active (Evenson and Wen, 2010). Many factors (e.g., pre-pregnancy inactivity, co-morbid health complications) predispose OW/OB women to be less active than normal weight women (Evenson and Wen, 2010; Zhang and Savitz, 1996).

OW/OB women also have different exercise attitudes, motivation, and perceived barriers compared to normal weight women (Symons Downs et al., 2014a, 2014b). In one of the only located studies to compare exercise motivation of normal weight and OW/OB women, OW/OB women reported "having no motivation" as their most salient exercise belief whereas normal weight women endorsed a more positive belief that exercise would help to "decrease their discomfort/soreness" (Symons Downs et al., 2014a, 2014b). OW/OB women also report less pleasure from exercise than normal weight women (Ekkekakis and

Lind, 2006). This may be due to increased perceived exertion from exercise and may be related to increased oxygen uptake and other physiological changes that occur over the course of pregnancy (Davenport et al., 2009; Mottola, 2013).

To successfully promote perinatal exercise behavior, it is essential to understand the underlying motivational determinants of women's exercise. A theoretical framework can provide insight for how to influence the behavior and develop interventions targeting modifiable factors to promote exercise (Symons Downs et al., 2012). One theory previously used to explain perinatal exercise behavior and motivation is the Theory of Planned Behavior (TPB; Ajzen, 1991; Hausenblas and Symons Downs, 2004; Symons Downs and Hausenblas, 2003, 2007). The TPB posits that a person's beliefs about a behavior influences her thoughts/cognitions (attitude), perceptions of social pressures to comply with the behavior (subjective norm), and view of whether the behavior will be difficult or easy to adopt (perceived behavioral control; Ajzen, 1991). Her attitude, subjective norm, and perceived behavioral control influence her motivation (intention) to perform the behavior, which in turn, predicts actual participation in the behavior.

To the authors' knowledge, there have been no studies that have examined how prior miscarriage and prepregnancy weight status impact exercise behavior. Considering the sensitive nature of these issues, there is a need to better understand the influences of prior miscarriage and prepregnancy weight status on exercise behavior so that health care providers can address these topics in clinical care and health promotion professionals can design interventions to effectively promote perinatal exercise behavior. The purposes of this study were to

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