ADVOCATING FOR ADHERENCE TO A PHYSICAL ACTIVITY REGIMEN DURING PREGNANCY: THE ROLE OF PARTNER SUPPORT

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ABSTRACT

The purpose of this study was to investigate the relationship between support received by pregnant women from their partners and physical activity levels during their pregnancy. 56 pregnant women participated in this study. Women completed a survey detailing demographic information, physical activity levels, and perceived support from their partner, and wore an accelerometer to monitor physical activity for 7-8 days. Participants who reported low overall PA support from their partner were 78% less likely to meet PA recommendations according to self-report, though there was no relationship with step count or rate. Given the findings, education for support networks is recommended.

Keywords: pregnancy, physical activity, social support

INTRODUCTION

Research has demonstrated numerous health benefits for both mother and offspring when the mother engages in a physical activity (PA) regimen during pregnancy (ACSM, 2006). However, recent evidence shows that only 14-23% of pregnant women meet the PA recommendations of 150 min/wk for pregnant women (Evenson & Wen, 2010; Evenson et al. 2004). Numerous studies identify barriers women may experience for meeting PA guidelines (Harrison et al., 2018; Cole et al., 2017). Social support may influence health behaviors in pregnant women. Close relationship partners, spouses, family members, and friends are typically viewed as the primary support providers in one's life. More specifically, spouses are typically the first consulted for support (High & Steuber, 2014). The purpose of this study was to examine the effect of perceived partner social support on PA in pregnant women. With the knowledge that physical activity levels have tremendous health outcomes for the expectant mother and offspring, more attention should be given to the factors that will increase their adherence to physical activity guidelines.

Research has shown that physical activity during pregnancy reduces risk of adverse outcomes (ACSM, 2006). For the mother, these outcomes include reduced risk for gestational diabetes, preeclampsia, and the need for an operative delivery. Additionally, higher physical activity levels can lead to less pregnancy weight gain and faster weight loss postpartum. For the

offspring, high physical activity levels of the mother can help normalize the birth weight and lead to less adiposity.

As previously mentioned, it has been shown that between 14 and 23% of pregnant women meet physical activity guidelines (Evenson & Wen, 2010; Evenson et al., 2004). Additionally, physical activity levels typically decline as the pregnancy progresses (Rousham et al., 2006). Reasons for this include physical limitations, fatigue, medical advice to reduce exercise, perceived risks, feelings unwell, and a lack of time (Clarke & Gross, 2004; Duncombe et al., 2009). As previously mentioned, because social support systems have such a strong relationship with health behaviors and outcomes, we aim to address the role of support from partners in increased adherence to physical activity guidelines during pregnancy.

Social support is defined as the resources provided by other persons (Cohen & Syme, 1985) which involve components such as empathy, sympathy, compassion, concern, validation of feelings, and encouragement shown toward one another (Rittenour & Martin, 2008). There exist positive physiological, psychological, and relational outcomes for people who receive emotional support (Burleson, 2003) and a strong social support network can lead to longer life expectancy, fewer illnesses, better overall physical health, and can aid in social functioning (Edwards et al., 2008; Sherbourne et al., 1992). Thus, we aim to investigate the role of partner social support in adherence to PA guidelines during pregnancy.

LITERATURE REVIEW

Pregnant women, regardless of the natural physiological changes resulting from pregnancy, benefit as much as non-pregnant women do from regular exercise (Guszkowska et al., 2013). The American College of Obstetricians and Gynecologists provides an outline for physical activity recommendations for pregnant women. The list points towards maintaining physical activity (PA) throughout pregnancy and the postpartum period to reduce specific pregnancy-related health outcomes and boost psychological well-being (Committee, 2015). Though this list comprises a general overview of the beneficial aspects of exercise while pregnant, there are many specific aspects of PA that provide health benefits to both maternal and fetal health. Regular PA has been shown as a potential route to maintain excessive gestational weight gain (GWG) (Jiang et al., 2012; Mottola et al., 2010), glucose tolerance associated with gestational diabetes (Oken et al., 2006), pre-eclampsia (Deierlein et al., 2012), preterm births (Both et al., 2010; Juhl et al., 2008), both large (LGA) and small for gestational age (SGA) infants (Phelan et al., 2011; Juhl et al. 2010). Knowledge of these benefits appears to be widely known by pregnant women. The majority of expectant mothers desire to meet PA recommendations in order to help keep their babies safe (Mulken et al., 2016). Thus, the health literacy levels for pregnant women regarding the benefits of PA during pregnancy and postpartum periods seems to be high. Though the relationship between appropriate PA levels and a healthy pregnancy is well documented, the gap between this knowledge and enacting these behaviors notes investigation.

When compared to inactive women during pregnancy, mothers that are active are shown to have to have greater mobility, ability to perform day-to-day actions, and vitality (Kolu et al., 2014). Identified regulation of active behaviors is heavily associated with fewer obstructions to PA, citing personal value of the benefits of exercise for maternal and fetal health (Gaston et al., 2013). Despite the known physical health benefits of PA, many expectant mothers still engage in highly sedentary behaviors (SB) (Evenson et al., 2011). Studies report that societal

influences (Mulken et al., 2016) strengthen identified regulation motivation to limit SB in the first trimester, but it gradually diminished in the second and third (Gaston et al., 2013). Similarly, studies report pregnant women's PA levels and moderate-to-vigorous physical activity (MVPA) time decreases over the course of the pregnancy (Evenson et al., 2011). As gestation progresses, the already low levels of both PA and MVPA both decrease significantly as trimesters progress (Thomson et al., 2016). In fact, pregnant women have been found to spend around 70% of their awake time engaged in SB independently of meeting prenatal PA recommendations (Evenson et al., 2011; Fabio, 2015). The amount of time spent in SB and low levels of PA over the course of a pregnancy is concerning, given the understanding of general recommendations for PA levels during pregnancy by healthcare professionals. Though many factors accounting for these rates can be argued, the role of partner support is significant based on our knowledge of the relationship between availability of social support and engagement in positive health behaviors.

In addition to physical health benefits, proper exercise during pregnancy can afford improved maternal mental health. Regulated PA while pregnant may play a large role in mental health disorder prevention (Guszkowska et al., 2015). Reports show that in as little as a single exercise class, pregnant women's emotional states can improve more than after attending a traditional childbirth education class (Guszkowska et al., 2013). Another report showed that for pregnant women who did not regularly exercise before their pregnancy, taking part in a four-week PA program during their pregnancy produced improvements in their psychological health for the duration of the program (Gaston & Prapavessis, 2013). Significant reductions in depression, anger, tension, trait anxiety, and increased energy were seen in women with sufficient PA (Gaston & Prapavessis, 2013; Padmapriya et al., 2016). Studies have also investigated the relationship between pregnancy and depression. When focusing on depression occurring only during the gestational period, expectant mothers who identify as having some depressive symptoms are generally less physically active than those women without symptoms. However, when these women take part in PA routines, an inverse relationship between depression symptoms and PA is observed (Loprinzi et al., 2012).

The impact of PA on both maternal physical and psychological health is evident. The motivation to maintain healthy exercise levels while pregnant offers not only increased likelihood of many fetal health outcomes, but also maternal benefits both physically and mentally.

Social support is defined as the resources provided by other persons (Cohen & Syme, 1985) that communicate to the targeted individual that they are valued (Barnes & Duck, 1994). Defining a behavior as supportive can be found in meanings of messages. If the meanings work together to reduce or manage uncertainty, they can be defined as supportive (Virtanen & Isotalus, 2011). Supportive messages communicate care and concern of another individual and provide the recipient with feelings that he or she is important to the support provider (Burleson et. Al, 1994). Social support's central function is essentially to enhance one's experience of self-control (Albrecht & Adelman, 1987). Different type of social support (e.g. emotional, instrumental, informational, companionship) each address different supportive goals (Wills, 2000). Emotional support encompasses expressions of empathy and sympathy and assurances, and instrumental support is more seen as the provision of tangible resources. Informational support involves providing advice or other information that can help a patient or partner feel more in control and knowledgeable, and network support, or companionship support, focuses on enhancing one's social availability and spending time with a partner (High & Steuber, 2014l; Wills, 2000; Roter & Hall, 1992; High & Steuber; 2014; Scott, 2014). Enacted support can buffer experiences of

stress and enhance coping skills among individuals (Goldsmith, D. J., 2004). The implications for receiving support are impactful, but the perception that support will be available is perceived as equally as significant as the enacted communication (Burleson, B.R. et. al, 1994; Frost, 2016).

Countless studies have displayed the connection between support behaviors and perceptions and quality of both physical and psychological health (see review by Cohen & Wills, 1985; Hobfall & Stephens, 1990; High & Steuber, 2014). Additional research findings indicate a correlational and causational connection between availability of social support and life expectancy, disease pathology, and immune system performance, and the ability to recover from illness (Wortman, 1984; Kenndy, Kiecolt-Glaser, & Glaser, 1990; Hobfoll & Stephens, 1990). Supportive communication can help speed healing, lessen pain, and reduce symptoms and stress (Metts & Manns, 1996). Additionally, the discussion of enacted support versus perceived availability of support connects to the health realm as well. Studies suggest that "whether or not one actually receives support is less important for health and adjustment than one's beliefs about its availability" (Cohen et. al, 2000, p.7).

People who have supportive social networks "tend to be psychologically healthier than people who lack them" (Frost, 2016), because social support increases the chances of having positive self-perceptions, feelings of control, relational closeness, and an increased sense of life satisfaction (High & Steuber, 2014). When support seekers experience an increase of acceptance and belonging through esteem and network support, (Virtanen & Isotalus, 2011), their levels of loneliness and anxiety are reduced (Sharpley et al., 2015).

Social support is thought to improve health through many channels, such as improving health behaviors (Cavallo et al., 2013). In fact, Burleson et. al note that "supportive, prosocial behavior received from friends, kin, acquaintances, work associates, and even strangers has remarkable effects, both direct and indirect, on physiology, cognition, and emotion" (1994, p. xi-xii). However, providing the wrong type of social support can have detrimental effects (Scott, 2014); thus, quality of support behaviors bears importance as well.

MATERIAL AND METHODS

Participants

A total of 56 pregnant women were recruited to participate in this study. Prospective participants were recruited from an obstetrics clinic, birthing classes, a prenatal yoga class, and by word of mouth. Each participant provided informed consent prior to participation, and the study was approved by the University Institutional Review Board. Two women did not complete the study; one did not return the accelerometer to the researchers and one accelerometer malfunctioned. The total sample size for analysis was n=54.

Procedures

The correlation with Social Support and physical activity level as measured by both self-report and accelerometer was analyzed. Actigraph Link accelerometers were used to objectively assess physical activity by measuring accelerations in three different planes in 1-second increments (called epochs). Participants wore them continuously on their non-dominant wrist for 7-8 days (removing for bathing or swimming). Sleep-time wear was optional and for those who did wear during sleep, the data collected during those times was excluded. The Link accelerometers also collect step data over all wear time, which was analyzed to determine total numbers of steps per day. Upon enrollment, participants completed and commenced

accelerometer wear. Participants were provided a pre-paid mailing envelope that they used to return the accelerometer at the end of the 7 days. Once their surveys and accelerometers were received, the researchers mailed the participant a gift card to thank them for their participation.

All participants wore an ActiGraph Link accelerometer for 7-8 days and completed a survey detailing demographic information, pregnancy history, physical activity, and perceived social support from their male spouse/partner generally and as related to PA. PA questions were adapted from the International Physical Activity Questionnaire (IPAQ) (Craig, 2003) and asked about moderate activities, vigorous activities, walking, and time spent sitting. Participants responded to a 9-item measure adapted from the Multidimensional Scale of Perceived Support (Zimet, Dahlem, Zimet & Farley, 1988) regarding their perception of supportiveness from their partner. Additionally, 13 statements about PA-related social support (Sallis et. al 1987), limited to during the current pregnancy, were included. Daily step counts and stepping speeds were calculated across all 7-8 days for each participant. Odds ratios (OR) and 95 percent confidence intervals (CI) were calculated to predict odds of meeting physical activity recommendations (of 150 minutes or more of moderate or vigorous physical activity weekly), meeting step count recommendations of 10,000 steps/day, or of accumulating time spent at walking speeds of at least 100 steps/min (considered to be moderate intensity) based upon demographic characteristics and types of PA support.

Total minutes per week of moderate and vigorous PA were calculated by multiplying the reported days per week of each type of PA by the minutes per day of that same type of PA. Similarly, walking time was calculated by multiplying reported minutes per day by days per week. A total moderate and vigorous PA (MVPA) score was calculated by adding the total time reported in moderate, vigorous, and walking PA. A total sitting time was calculated by multiplying the reported hours per weekday by five and adding two times the reported weekend hours spent sitting. Accelerometer-recorded steps per day was recorded from the accelerometer software program (ActiLife), and step data was calculated in 1-minute epochs to calculate minute-by-minute stepping rates, or cadence, as prior research has shown that walking cadences greater than 100 steps/min is equivalent to moderate intensity physical activity (Tudor-Locke et al., 2005).

Social support was assessed by survey questions based upon both perceived general social support from the woman's male spouse/partner (i.e. 'My partner is around when I am in need') and social support from the spouse/partner in regards to exercise and PA (i.e. 'My partner gave me encouragement to stick with my exercise program'). Nine statements were provided describing general social support, and each woman reported the degree to which she agreed or disagreed with the statement on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). A total general social support score was calculated by adding the scores from each of the 9 questions together; possible scores ranged from 9 to 45. Thirteen statements about PA-related social support, limited to during the current pregnancy, were provided to the participants. Each statement was scored on a scale of 1 (none) to 5 (very often). The PA-related social support questions were categorized into one of four categories: emotional support, companionship support, informational support, and instrumental support.

Data Analysis

For analysis, continuous and ordinal variables were converted to dichotomous variables. For all social support scores, the sum of the Likert scale questions (1-5) was calculated and divided by the number of questions in the category to calculate a mean score for each sub-type of

social support and for perceived general and PA support. A score of less than three was considered to be low support and a score of three or greater was considered to be high support. PA was converted to a dichotomous variable by calculations of minutes per week of moderate or vigorous PA; women who accumulated at least 150 minutes per week were considered to meet PA recommendations and those with less than 150 minutes per week accumulated did not meet PA recommendations.

Means and standard deviations were calculated for demographic information as were frequencies, in percentages, as appropriate. Odds ratios and 95 percent confidence intervals were calculated to predict odds of meeting physical activity recommendations (of 150 minutes or more of moderate or vigorous physical activity) weekly based upon demographic characteristics and types of physical activity support.

RESULTS

Average age of participants was 30.7±4.7 years and average gestation was 25.7±7.5 weeks (see Table 1). 92.6% were married and 71.7% had a college degree (see Table 2). Average self-reported moderate PA time was 98.3±124.5 min/wk while vigorous time reported was 33.2±63.3 min/wk. According to self-report, 22.2% spent no time in moderate PA, 64.8% spent no time in vigorous PA, and 24.1% met PA recommendations (see Table 3). Average step counts were 11,000.3±2900.0. 60% of the sample met step recommendations of 10,000 steps/day while 48.9% spent at least some time daily in stepping rates greater than 100 steps/min (considered to be moderate intensity). Participants who reported low overall PA social support from their partner were 78% less likely to meet PA recommendations according to self-report (OR=0.22, CI=0.05-0.88) but there was no effect on step count or step rate. Additionally, none of the sub-types of support significantly increased or decreased odds of meeting PA or step recommendations or of spending time at moderate intensity PA. The sample consisted mostly of married and well-educated women (see Table 2). Only 24.1% of the enrolled women met PA recommendations of 150 minutes per week or more of moderate or vigorous PA. More than half (64.8%) reported no vigorous PA at all and 22.2% reported no moderate PA. Thus, women who perceive low total PA support are 78% less likely to meet PA recommendations of 150 min/wk as measured by self-report, but PA support had no effect on PA as measured by accelerometer (see Table 4 and Table 5).

n=54	**MEAN**		**SD**
AGE (YRS)	30.7	±	4.7
HEIGHT (IN)	65.7	±	3
PREPREGNANCY WEIGHT (LB)	152.8	±	38.4
CURRENT WEIGHT (LB)	168.5	±	34
GESTATION (WKS)	25.7	±	7.5

Table 1. Demographic characteristics of 54 pregnant, female participants. Data presented as means ± standard deviations.

n=54		FREQUENCY
% MARRIED		92.6%
EDUCATION	HS or GED	3.8%
	Some college	24.5%
	College degree	39.6%
	Graduate degree	32.1%
PARITY	First pregnancy	39.6%
	Second pregnancy	32.1%
	Third pregnancy	13.3%
	Fourth pregnancy	15.1%
MISCARRIAGE	1 miscarriage	20.8%
	2 miscarriages	0.0%
	3+ miscarriages	1.9%
PREVIOUS HIGH RISK PREGNANCY		14.8%
CURRENT HIGH RISK PREGNANCY		9.3%
INFERTILITY EVER		18.9%
INFERTILITY TX CURRENT PREGNANCY		3.7%
PRIOR C-SECTION		25.9%

Table 2. Demographic characteristics of 54 pregnant, female participants. Data presented as means ± standard deviations.

n=54	MEAN		SD
MODERATE (MIN/WK)	98.3	±	124.5
VIGOROUS (MIN/WK)	33.2	±	63.3
WALK (MIN/WK)	211.8	±	277.2
SIT (HR/WK DAY)	6.4	±	3.4
SIT (HR/WKEND DAY)	5.7	±	3.4

Table 3. Average number of minutes per week or day of various intensities of PA according to self-report. Data presented as means ± standard deviations.

Scores for Social Support

	Mean	SD
General Support	4.68	± 0.57
PA Support Total	2.48	± 0.77
Companionship PA Support	2.40	± 0.98
Emotional PA Support	2.91	± 1.13
Instrumental PA Support	1.98	± 0.75

	Meets PA Recommendations (Self-report)		
	OR	CI	
Married (yes)	*1.32**	*1.13*	*- 1.55*
Education (Bachelor's or more)	*1.31**	*1.01*	*- 1.71*
Income (70K per year or more)	1.06	0.76	- 1.48
Parity (at least one previous live birth)	1.03	0.75	- 1.41
Gravidity (first pregnancy)	1.12	0.82	- 1.52
Childcare (primary caregiver for at least one child)	1.22	0.91	- 1.64
Miscarriage (none)	0.40	0.16	- 1.00
Infertility (yes, at some point)	1.11	0.71	- 1.72
Medical treatment for infertility (yes)	2.25	0.73	- 6.91
Previous high risk pregnancy (yes)	1.32	0.49	- 3.54
Current high risk pregnancy (yes)	1.20	0.19	- 7.40
C-section ever (yes)	1.20	0.43	- 3.39

Table 4. Odds ratios (OR) for meeting PA recommendations according to self-report data. CI = confident interval. Statistically significant ORs are italicized.

		Meets PA Recs (SR)				Meets Step Recs				Any MVPA (steps)			
		OR	CI			OR	CI			OR	CI		
Average Total PA Support	Low	0.22*	0.05	-	0.88	0.68	0.17	-	2.71	0.94	0.25	-	3.53
Emotional Support	Low	1.79	0.48	-	6.60	1.60	0.46	-	5.53	1.56	0.47	-	5.19
Instrumental Support	Low	..	..	-	..	1.00	0.15	-	6.67	1.50	0.23	-	9.96
Informational Support	Low	0.72	0.17	-	3.16	5.15	0.98	-	27.20	1.24	0.34	-	4.56
Companionship Support	Low	0.42	0.11	-	1.65	1.10	0.29	-	4.21	0.94	0.25	-	3.53

Table 5. Odds ratios (OR) for meeting PA recommendations by self-report (SR), step recommendations (10,000 steps/day), or accumulating any MVPA steps over a day (defined as cadence of 100 steps/min or faster) according to type of PA support perceived from spouse/partner. For all types of support, high support is the reference category (OR = 1.0). OR could not be calculated for instrumental support and SR PA Recs due to too few participants reporting low instrumental support.

DISCUSSION

Our study provides critical insights to the investigation of relational factors that could stimulate an increase in pregnant women's physical activity levels. As reported in this study and as evidenced by countless research findings, many pregnant women are not meeting their recommended 150 minutes per week of moderate to vigorous PA. Only ~24% of women who completed the present study reported these levels and ~22% reported no moderate PA. Medical researchers have long been investigating methods to improve these numbers as reports in recent years have consistently shown the benefits of PA during pregnancy. Many factors have been analyzed as to how to account for these low levels, as the information regarding benefits of PA during pregnancy has become more widely accepted by the general population. Many physical and demographic factors have been considered. However, there has existed a gap in the literature in terms of the relational dynamics (specifically the presence or lack thereof of social support) that are at play when considering impact on PA during pregnancy.

OBGYN physicians have long been suggesting that the days of encouraging pregnant women to remain inactive are gone. Aside from exceptional physical circumstances where physical activity could cause harm to either the mother or offspring, guidelines for PA levels during pregnancy remain at 150 minutes per week. However, though these guidelines have been consistently reflective of an active lifestyle for many years, participation in PA in the U.S. has yet to reach desired levels. Many factors are potentially at play to account for this gap, and our study addresses a relational context worth considering. With the knowledge that the availability of and provision of effective social support has been documented to have significant connections to improved health outcomes (see review by Cohen & Wills, 1985; Hobfall & Stephens, 1990; High & Steuber, 2014; Wortman, 1984; Kenndy, Kiecolt-Glaser, & Glaser, 1990), attention should be given to the implications for a supportive family environment during pregnancy.

The results of the present study reveal the benefits of social support during pregnancy. Though the analyses for the relationship between perception of supportiveness overall and PA levels was not significant, results did show a significant relationship between social support received regarding PA and PA levels. Thus, the amount and quality of support that a woman receives regarding physical activity during pregnancy can have a significant impact on whether she will achieve these PA standards.

CONCLUSIONS

The perception and provision of effective social support can play a vital role in a person's health overall and specifically as it relates to their engagement in positive health behaviors. The present study supports this notion by showing evidence to a relationship between a lack of subject-specific supportive communication and engagement in a particular health behavior (in this case, PA). Further study is needed to investigate factors accounting for the perceived low levels of supportiveness regarding PA from partners during pregnancy, especially with the knowledge in mind that women reported high levels of supportiveness from their partners overall. Additionally, the converse could also be true that a woman who exercises during pregnancy will also gain more support from spouse since he wants to support her interests.

Implications are strong here for the need to educate pregnant women's support network on PA guidelines during pregnancy as well as for the need to provide effective resources and training for support networks on effective communication of support during the pregnancy experience, specifically regarding PA.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

One potential limitation of this study is that most women reported feeling that they have a supportive relationship with their partner overall, yet they did not feel supported specifically as it relates to PA. Either partners are not communicating well regarding PA or participants over-report general supportiveness. This question warrants investigation.

Additionally, there was a significant difference in PA levels reported by the participants in the self-report measure and the PA as recorded by the accelerometers. This discrepancy caused the investigators to rely more heavily on self-report data, which can be affected by participant bias. There are no published equations for prediction of PA utilizing wrist-worn accelerometers in pregnant women, despite known inaccuracies with hip-worn devices in this population due to the changing tilt of the device as the woman's abdomen grows (DiNallo et al. 2012). There also was not as much variance regarding type of support as expected, and in future study, study procedures should be refined to account for these variables more effectively. Other variables should be considered in future study as well such as access to safe exercise environments and access to information related to physical activity procedures as well as its benefits. Lastly, further investigation should be pursued regarding the experience of the support providers and the factors influencing their decisions and behaviors regarding the provision of support to their partners, both during pregnancy and in general.

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