

Physical Activity and Muscular Strengthening in Pregnancy: A Rural Urban Comparison

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Abstract

Though known to improve pregnancy outcomes, physical activity generally decreases through pregnancy. Though some research has shown rural American women to be less active than urban dwellers, little is known regarding differences in such specific activities between rural and urban pregnant women.

Purpose: The purpose of this study was to compare self-reported physical activity patterns and muscular strength training activities between rural and urban pregnant women.

Sample: Sample included 88 rural and urban pregnant women, mean age 25.83, in the southeastern region of the United States.

Method: Women were recruited from the waiting rooms of regional obstetrician offices. Following consent, physical activity was assessed by the short-form of the International Physical

Activity Questionnaire (IPAQ), and muscular strengthening activity was measured by an adapted self-report questionnaire.

Findings: Several significant differences between rural and urban women included total number of minutes of moderate intensity physical activity, number of days per week of moderate activity, and time spent in resistance training. There was also a difference in total activity between participants with a high school education or lower and those with a college or higher education. There was no significant difference in total physical activity among trimesters for the entire group or between groups, showing no change across pregnancy.

Conclusions: Rural pregnant women are less likely to engage in some levels of physical activity than urban counterparts. Further investigation is recommended to understand specific factors influencing health and activity patterns of rural pregnant women.

Keywords: Physical activity, Muscle strengthening, Pregnancy and Rural

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National guidelines for physical activity in adults are provided by two leading public health organizations. The 2008 physical activity guidelines were made available by the US Department of Health and Human Services (USDHHS, 2008) and in 2007 by the American College of Sports Medicine (2011; Haskell, et al., 2007). These recommendations include: (a) physical activity of moderate intensity, 30 minutes for 5 days per week or 150 minutes per week; (b) vigorous intensity, 20 minutes for 3 days per week or 75 minutes per week, and (c) 6 to 10 muscle-strengthening exercises with 8 to 12 repetitions of each exercise twice a week. The same levels of moderate intensity physical activity are specifically recommended for pregnant women. The American College of Obstetricians and Gynecologists (ACOG) encourages pre-pregnancy

maintenance of vigorous intensity and muscular-strengthening exercises with only slight modifications (ACOG, 2007; Artal & O'Toole, 2003).

For the general population, health benefits of physical activity include weight control, reduced risk of hypertension, cardiovascular disease, and type II diabetes <http://www.cdc.gov/physicalactivity/everyone/health/index.html> (CDC, n.d.a). There are additional benefits for pregnant women, including increased energy; enhanced mood; improved posture, muscle tone, strength, and endurance; reduction of back pain, constipation, bloating, and swelling; improved sleep, and prevention or treatment of gestational diabetes (ACOG, 2007; Artal & O'Toole, 2003). Many studies have demonstrated declining physical activity patterns in pregnancy from the first to third trimester (Borodulin, Evenson, Wen, Herring, & Benson, 2008; Evenson & Wen, 2010; Fell & Dobbs, 2009; Schmidt, Pekow, Freedson, Markenson, & Chasan-Taber, 2006), leading to reduced known benefits from exercise.

Growing research on physical activity during pregnancy continues, but there is little information that includes women living in rural communities, even though it is increasingly evident that rural residents are least likely to meet national recommendations for physical activity (Parks, Housemann, & Brownson, 2003). Parks et al. (2003) demonstrated that both income level and rural or urban status are important predictors of adults' likelihood to meet physical activity recommendations. Another study examined the perceptions of low-income rural mothers regarding their need for nutrition and physical activity education (Atkinson, Billing, Desmond, Gold, & Tournas-Hardt, 2007). Participants indicated little knowledge about physical activity recommendations, and reported activity patterns that were likely inflated from perceptions of general housework chores and child care as exercise.

Beyond simple exercise, muscular strength training is currently recommended as part of the recommendations for physical activity for healthy adults. CDC reported, “Research has shown that strengthening exercises are both safe and effective for women and men of all ages, including those who are not in perfect health. In fact, people with health concerns—including heart disease or arthritis—often benefit the most from an exercise program that includes lifting weights a few times each week” www.cdc.gov/physicalactivity/growingstronger/why/index.html (CDC, n.d. b para. 1). A gap in the literature continues concerning women’s participation in muscular-strengthening exercises. One recent study revealed that only 18.3% of women actually engage in muscle strengthening activities two or more times per week (Carlson, Fulton, Schoenborn, & Loustalot, 2010). Long recognized benefits of muscular-strengthening exercises during pregnancy include improving posture to reduce low back pain, strengthening weight-bearing muscles for mobility as weight gain continues, and easing labor and recovery. Barakat and associates (Barakat, Lucia, & Ruiz, 2009; Barakat, Ruiz, Stirling, Zakythinaki, & Lucia, 2009; Barakat, Stirling, & Lucia, 2008) investigated safety concerns, time and type of delivery, and newborn outcomes related to light resistance exercise training in the second and third trimesters and found no negative health effects on mother or child. Though such studies continue to confirm the value of activity and strength training in pregnancy, and public health nurses in rural and urban settings continue to promote healthy exercise, there is little research on actual activity patterns or muscular strengthening activities among women, particularly in rural settings.

Most research in this area has been performed by research teams within a specific discipline, such as physical education, public health, health education, sports medicine, or nursing. There is a need for continued study by inter-professional teams.

The purpose of this study was to investigate the exercise patterns of rural and urban pregnant women residing in the southeastern region of the United States. The specific aims of

this preliminary study were to compare the self-reported physical activity patterns and muscular strengthening or resistance training activities of rural and urban pregnant women.

Method

Design and Sample

The research method was a cross-sectional design. A convenience sample of 88 reportedly healthy pregnant women (53 rural residents and 30 urban residents; mean age 25.83 years, 4.99 SD sample) was recruited from three regional obstetrical practices in the southeastern United States. Participants were excluded if they were under 18 years of age or did not completely respond to research questionnaires. Completion of tools was voluntary following written informed consent, and data were recorded without identifying information. The study was approved by the Human Subject Committee of the sponsoring university's Institutional Review Board.

Rural was defined as residence 1) outside Census Places with a population less than 25,000 and 2) within an area designated as non-metro based on definitions of the federal Office of Management and Budget, United States Department of Agriculture[USDA] (2010). *Urban* was defined as residence inside a metro-based town or city with a population greater than 25,000 (USDA, 2010).

There were no significant differences in general demographic characteristics between the rural and urban groups. Participants were primarily in the second or third trimester, (n = 24 and n = 43, respectively). Racial background was comparable to that in the geographical area with majority being white (n = 50, 60.2%) and African American (n = 28, 33.7%). Basic demographic characteristics of the women in this study are shown in table 1.

Instruments

This version of the IPAQ has been found to be valid and reliable (Spearman's $p = -.76$) (Craig, et al., 2003; Hagströmer, Oja, & Sjöström, 2006). The IPAQ scoring protocol assigns the following metabolic equivalent (MET) energy expenditure values to walking, moderate, and vigorous intensity activity: 3.3 METs, 4.0 METs, and 8.0 METs, respectively.

Table 1

Frequencies and percentiles of demographic characteristics of participants (n = 88)

Variable	N	(%)	Variable	N	(%)
Racial / Ethnic Background (n = 83)			Age (n = 82)		
White	50	60.2	18 - 25	40	48.8
Black	28	33.7	26 - 35	40	48.8
Hispanic	2	2.4	≥36	2	2.4
Asian	0	0.	Gestational Status (n = 79)		
Multi-racial	1	1.2	1 st trimester	12	15.2
Other	2	2.4	2 nd trimester	24	30.4
Education (n = 82)			3 rd trimester	43	54.4
<H.S. Diploma or GED	28	34.1	Residence (n = 83)		
≥College	54	65.9	Urban	30	36.1
Income			Rural	53	63.9
< \$25,000	29	37.2	IPAQ Physical Activity Score (n= 88)		
\$ 25,001-50,000	28	35.9	Low	27	30.7
\$ 50,001-75,000	13	16.7	Moderate	33	37.5
\$ 75,001-100,000	8	10.3	High	28	31.8
>\$ 100,000	0	0.	Smoking Status (n = 82)		
BMI Classification, pre-pregnancy (n= 88)			Yes	7	8.5
Underweight	3	4.2	No	75	91.5
Normal	34	47.2			
Overweight	18	25.			
Obese	17	23.6			

n = number of subjects in category

Muscular strengthening activity. Activity in muscularly strengthening, or resistance, exercises was assessed by a questionnaire adapted from questions in the IPAQ, seeking the typical number of days per week that participants engage in resistance training and the average number of minutes per day for such muscle strengthening exercises. Following an explanation of

resistance training, sample questions included, “Resistance training activities refer to activities that strengthen or tone muscle such as push-ups, sit-ups or weight training. Think about all the resistance training activity that you did in the last seven days. During the last 7 days, how much time did you spend resistance training on a week day? ___hours per day, ___minutes per day, ___ don’t know/not sure.”

Analyses

All data were submitted to SPSS 14.0. Descriptive statistics were calculated for all variables and demographics. To assess differences between groups, independent samples t test, chi-square analyses, and one-way analysis of variance were used.

Results

Physical Activity

The total METs for both groups, reported in minutes per week averaged 597.2, or nearly 10 hours per week. Though the urban group averaged higher in overall activity, the difference was not statistically significant at the $p = .05$ level or less (see table 2).

Table 2

Total Metabolic Equivalent (MET/Min/Week) by Trimester (n = 79) and by Location

Trimester	Overall METs		Rural METs		Urban METs	
	N	X (SD)	N	X (SD)	N	X (SD)
1 st	12	739.6 (256.2)	7	844.5 (368.0)	5	592.8 (377.2)
2 nd	24	716.3 (179.9)	16	585.8 (168.7)	8	977.3 (427.5)
3 rd	43	490.9 (160.9)	26	341.6 (157.9)	17	719.3 (326.9)
Total	79	597.6 (109.9)	49	493.2 (165.3)	30	767.0 (221.5)

There was no significant difference in total METs among trimesters of pregnancy for the entire sample. Additionally, no differences were found in the physical activity score (low, medium, high) among trimesters for the entire group (see table 3).

No difference was detected comparing rural and urban residents by trimester, although there appeared to be a greater trend in declining activity by trimester among rural women. The IPAQ gives a cumulative MET scoring for overall physical activity, derived from the sum of high, moderate, and low physical activity.

Table 3

Descriptive n (%) of Physical Score by Trimester and Location

Trimester/ PA Scores	1 st	2 nd	3 rd	Rural	Urban
Low	1 (4.5)	5 (22.7)	16 (72.7)	17 (32.1)	8 (26.7)
Medium	5 (16.1)	8 (25.8)	18 (58.1)	20 (37.7)	11 (36.7)
High	6 (23.1)	11 (42.3)	9 (34.6)	16 (30.2)	11 (36.7)
Total	12 (15.2)	24 (30.4)	43 (54.4)		

n = 79 trimester data

Breaking out moderate activity, a significant difference was revealed, with urban women reportedly engaging in nearly twice the amount of time overall (rural m = 52.17, SD = 17.9; urban m = 100.00, SD = 31.78), as shown in table 4.

Table 4

Descriptive International Physical Activity questionnaire (IPAQ) raw data by rural and urban (n = 88)

Activity Level	Rural X (SD)	Urban X (SD)	t-value	p
Vigorous activity, days per week	.81 (0.21)	.93 (1.32)	0.41	.52
Vigorous activity, minutes per day	33.32 (15.1)	27.17 (16.7)	0.26	.62
Moderate activity, days per week	1.87 (0.29)	2.17 (0.47)	2.58	.11
Moderate activity, minutes per day	52.17 (17.9)	100. (31.78)	4.63	.03*
Walking, days per week	5.32 (0.28)	5.2 (.35)	0.13	.72
Walking, minutes per day	92.45 (19.48)	128. (31.66)	2.10	.15
Sitting, minutes per day	277.89 (43.16)	334. (61.88)	0.65	.42

Statistically significant ($p \leq .05$), marked with *

Subsequent analysis revealed a significant difference between the number of days per week of moderate activity between those with a high school education or lower (m = 1.32, SD = .32) and those with college or higher education (m = 2.40, SD = .35) ($p < .05$).

Muscular Strengthening Activity

There was a significant difference in reports of time spent in resistance training between urban and rural pregnant women. Rural women reported a mean of 4.94 (SD 1.87) minutes of muscular strengthening exercises, while urban women participated in 20.67 (SD 13.16) minutes, resulting in a statistically significant difference between the two groups on an independent t-test ($t = 11.18, p < .001^*$).

Discussion

Physical Activity

Though results of this study show an apparent clinical difference in the total overall METs, or degree of physical activity (see table 1), between rural and urban pregnant mothers the difference was not statistically significant. Neither did results indicate a significant difference in amount of time in total physical activity per week. However, data did indicate a significant difference between groups in regard to the number of minutes per week of moderate physical activity (see table 4). Thus, urban women appeared to engage more often in moderate activities like bicycling, exercising, and carrying light loads. This finding is consistent with previous research of rural adults whom were less likely to achieve the recommended level of physical activity (Parks, et al., 2003).

Factors associated with this decreased level of physical activity among rural women might include issues of access to physical activity outlets, such as walking paths, safe neighborhoods, community fitness centers, or malls (Brownson, Boehmer, & Luke, 2005); or to cultural and social patterns of activity engagement. Other researchers have found similar environmental factors among rural populations (Deshpande, Baker, Lovegreen, & Brownson, 2005; Kaczynski, Potwarka, & Saelens, 2009). This study also confirmed other research showing level of

education, which is often higher among urban residents, to be related to physical activity patterns, especially among women (Chichlowska, et al., 2008; Frank, Schmid, Sallis, Chapman, & Saelens, 2005; Seeman, et al., 2008).

Muscular Strengthening Activity

The participation in muscular strengthening exercise was significantly related to geographical place of residence; with urban pregnant women ($m = 20.67$, $SD = 13.16$) engaging in more minutes per day of muscular strengthen exercises compared to rural women ($m = 4.94$, $SD = 1.87$). Muscular strengthening, or resistance training, has been shown to be related to numerous health benefits (Hass, Feigenbaum, & Franklin, 2001). A recent report found that 18% of adult women are not achieving the recommended level of muscular strengthening (Carlson, et al., 2010). Prevalence of participation in muscular strengthening activities among pregnant women is currently largely unknown, since research has focused on clinical trials among other populations (Hunter, McCarthy, & Bamman, 2004). Further investigations, including clinical trials, among pregnant women, especially in rural communities, are warranted.

Limitations of the Study

The limitations of the study underscore the need for more research in this area. First, the sample is relatively small and drawn from one southeastern region of the United States. Second, measurements relied on self-report, and thus it is not known the extent to which participants were inclined to provide socially desirable responses. Further, because of the preliminary nature of the study, the short form of the IPAQ was used. The long form may have elicited responses that may have related better to strength training in rural living, such as chopping wood or gardening. Many existing tools may not capture unique aspects of rural living. Third, recruitment of the sample from participants' own physicians' offices may have had some effect on sample bias due

to the focused recruitment site. Finally, the cross-sectional design only provides a snapshot of current status or perceptions, and does not allow a longitudinal view of exercise patterns or reports of the past or future.

Conclusions and Implications for Rural Nurses

This study represents a beginning effort to discover issues related to physical activity and muscular strength training in order to improve the health of rural pregnant women, and subsequently, their children. To date, few studies have examined both patterns of physical activity and muscular strengthening exercises in pregnant women across residential areas.

This work also shows the importance of an interdisciplinary approach to research on aspects of health promotion. The research team included experts in public health nursing, rural health, exercise science, and kinesiology. This approach opened a broad view of current research literature, appropriate measures for data collection, and clinical experience with the population. Rural nurses are on the front lines to promote and monitor physical activity and other health promotion measures for women in pregnancy. Working with practitioners from a broad variety of health professions, even by distance, can enhance the effectiveness of health care.

Our data suggest some differences that may exist in physical activity patterns, specifically in the amount of daily moderate physical activity and muscular strengthening activities. Further study is needed related to factors that may affect physical activity and strength exercise, including exposure to cultural choices, means of transportation, and the spectrum of choices in commercial, environmental, and social interactions in rural communities. We recommend further investigations into these areas with other expanded means of data collection including the use of accelerometers, qualitative data from the women regarding factors related to physical activity and environment, larger sampling, and randomized controlled trials to determine most effective

interventions. Further research that targets the value of strength training in the daily life of pregnant women and for studies that lead to effective interventions to promote health among women and children is needed. Prospective studies might investigate the effects of such interventions beyond health of mothers to include infants, child fitness, and ultimate prevention of obesity among all family members. Certainly, data indicate a need for special focus on such factors among rural populations.

Nurses who practice in rural settings are well aware of challenges related to social isolation, distance from services, cultural patterns, socio-economic issues, and other factors may have an effect on the health promotion behaviors of women in pregnancy. More research is needed beyond simply describing the characteristics of rural residents, but also regarding specific measures that promote appropriate behaviors for mothers in rural communities.

References

- American College of Obstetricians and Gynecologists (ACOG). (2007). ACOG Committee Opinion No. 267. Exercise during pregnancy and the postpartum period. *Obstetrics & Gynecology*, 99(1), 171-173. [[MEDLINE](#)]
- American College of Sports Medicine (ACSM). (2011). *Physical activity and public health guidelines*. Retrieved from <http://www.acsm.org/about-acsm/media-room/acsm-in-the-news/2011/08/01/acsm-aha-support-federal-physical-activity-guidelines>.
- Artal, R., & O'Toole, M. (2003). Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period. *British Journal of Sports Medicine*, 37, 6-12. [[MEDLINE](#)]
- Atkinson, N. L., Billing, A. S., Desmond, S. M., Gold, R. S., & Tournas-Hardt, A. (2007). Assessment of the nutritional and physical activity education needs of low-income, rural

mothers: Can technology play a role? *Journal of Community Health*, 32, 245-267.

[\[MEDLINE\]](#)

Barakat, R., Lucia, A., & Ruiz, J. R. (2009). Resistance exercise training during pregnancy and newborn's birth size: A randomized controlled trial. *International Journal of Obesity*, 33, 1048-1057. [\[MEDLINE\]](#)

Barakat, R., Ruiz, J. R., Stirling, J. R., Zakyntinaki, M., & Lucia, A. (2009). Type of delivery is not affected by light resistance and toning exercise training during pregnancy: A randomized controlled trial. *American Journal of Obstetrics & Gynecology*, 201(6), 590, e1-6. [\[MEDLINE\]](#)

Barakat, R., Stirling, J. R., & Lucia, A. (2008). Does exercise training during pregnancy affect gestational age? A randomized controlled trial. *British Journal of Sports Medicine*, 42, 674-678. [\[MEDLINE\]](#)

Borodulin, K. M., Evenson, K. R., Wen, F., Herring, A. H., & Benson, A. M. (2008). Physical activity patterns during pregnancy. *Medicine & Science in Sports & Exercise*, 40, 1901-1908. [\[MEDLINE\]](#)

Brownson, R. C., Boehmer, T. K., & Luke, D. A. (2005). Declining rates of physical activity in the United States: What are the contributors? *Annual Review of Public Health*, 26, 421-444. [\[MEDLINE\]](#)

Carlson, S. A., Fulton, J. E., Schoenborn, C. A., & Loustalot, F. (2010). Trend and prevalence estimates based on the 2008 Physical Activity Guidelines for Americans. *American Journal of Preventive Medicine*, 39, 305-313. [\[MEDLINE\]](#)

Centers for Disease Control and Prevention (CDC). (n.d.a). *Physical activity and health*.

Retrieved from CDC website <http://www.cdc.gov/physicalactivity/everyone/health/index.html>

Centers for Disease Control & Prevention (CDC) (n.d.b). *Why strength training?* Retrieved from

<http://www.cdc.gov/physicalactivity/growingstronger/why/index.html> .

Chichlowska, K. L., Rose, K. M., Diez-Roux, A. V., Golden, S. H., McNeill, A. M., & Heiss, G.

(2008). Individual and neighborhood socioeconomic status characteristics and prevalence of metabolic syndrome: The Atherosclerosis Risk in Communities (ARIC) Study. *Psychosomatic Medicine*, 70, 986-992. [[MEDLINE](#)]

Craig, M. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., ...

Oja, P. (2003). International physical questionnaire: 12-country reliability and validity. *Medicine & Science in Sports & Exercise*, 35, 1381-1395. [[MEDLINE](#)]

Deshpande, A., Baker, E. A., Lovegreen, S. L., & Brownson, R. C. (2005). Environmental

correlates of physical activity among individual with diabetes in the rural Midwest. *Diabetes Care*, 28, 1012-1018. [[MEDLINE](#)]

Evenson, K. R., & Wen, F. (2010). National trends in self-reported physical activity and

sedentary behaviors among pregnant women: NHANES 1999-2006. *Preventive Medicine*, 2010, 1-6. [[MEDLINE](#)]

Fell, D., & Dobbs, L. (2009). The impact of pregnancy on physical activity levels. *Maternal*

Child Health Journal, 13, 597-603.

Frank, L. D., Schmid, T. L., Sallis, J. F., Chapman, J., & Saelens, B. E. (2005). Linking

objectively measured physical activity with objectively measured urban form: Findings from SMARTRAQ. *American Journal of Preventive Medicine*, 28, 117-125. [[MEDLINE](#)]

- Hagströmer, M., Oja, P., & Sjöström, M. (2006). The International Physical Activity Questionnaire (IPAQ): A study of concurrent and construct validity. *Public Health & Nutrition, 9*, 755-762. [[MEDLINE](#)]
- Haskell, W. L., Lee, I. M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A...Bauman, A. (2007). Physical activity and public health: Updated recommendations for adults from the American College of Sports Medicine and the American Heart Association. *Medicine & Science in Sports & Exercise, 39*, 1423-1434. [[MEDLINE](#)]
- Hass, C. J., Feigenbaum, M. S., & Franklin, B. A. (2001). Prescription of resistance training for healthy populations. *Sports Medicine, 31*, 953-964. [[MEDLINE](#)]
- Hunter, G. F., McCarthy, J. P., & Bamman, M. M. (2004). Effects of resistance training on older adults. *Sports Medicine 34*, 329-348. [[MEDLINE](#)]
- Kaczynski, A. T., Potwarka, L. R., & Saelens, B. E. (2009). Association of park size, distance and features with physical activity in neighborhood parks. *American Journal of Public Health, 98*, 1451-1456. [[MEDLINE](#)]
- Maddison R., Mhurchu, C.N., Jiang, Y., Vander Hoorn, S., Rodgers, A., Lawes, C. M., & Rush, E. (2007). International Physical Activity Questionnaire (IPAQ) and New Zealand Physical Activity Questionnaire (NZPAQ): A doubly labeled water validation. *International Journal of Behavioral Nutrition, & Physical Activity, 4*, 62. [[MEDLINE](#)]
- Parks, S. E., Housemann, R. A., & Brownson, R. C. (2003). Differential correlates of physical activity in urban and rural adults of various socioeconomic backgrounds in the United States. *Journal of Epidemiology & Community Health, 57*(1), 29-35. [[MEDLINE](#)]

- Schmidt, M. D., Pekow, P., Freedson, P. S., Markenson, G., & Chasan-Taber, L. (2006). Physical activity patterns during pregnancy in a diverse population of women. *Journal of Women's Health, 15*, 909-918. [[MEDLINE](#)]
- Seeman, T., Merkin, S. S., Crimmins, E., Koretz, B., Charette, S., & Karlamangla, A. (2008). Education, income and ethnic differences in cumulative biological risk profiles in a national sample of US adults: NHANESIII (1988-1994). *Social Science & Medicine, 66*(1), 72-87. [[MEDLINE](#)]
- United States Department of Agriculture (USDA) (2010). *Rural definitions: Georgia*. Retrieved from <http://www.ers.usda.gov/data/ruraldefinitions/GA.pdf>.
- United States Department of Health and Human Services (2008). Physical Activity Guidelines Advisory Committee. *Physical activity guidelines advisory committee report, 2008*. Washington, DC: Author.