

Lifestyle Physical Activity of Older Rural Women

Donna J. Plonczynski,^{1*} JoEllen Wilbur,^{2**} Janet L. Larson,^{3†} Keith Thiede^{4‡}

¹School of Nursing, Northern Illinois University, 1240 Normal Rd., DeKalb, IL 60115

²College of Nursing, Rush University, Chicago, IL

³Division of Acute, Critical and Long Term Care Programs School of Nursing, University of Michigan, Ann Arbor, MI

⁴Educational Psychology, Boise State University, Boise, ID

Accepted 16 February 2008

Abstract: The purpose of this study was to describe and examine the lifestyle physical activity behaviors (household, leisure, occupational) of older rural women. Background characteristics included demographics, environment, social support, and health. Intrapersonal characteristics included motivation and self-efficacy. The majority of the women's energy expenditure was in the household dimension. Social support was positively associated with household activities. A higher level of leisure physical activity was associated with living within the two small cities and reporting lower levels of health and lower motivation. This research highlights the importance of household physical activity and the contribution of social support for household physical activity, both of which may be important in developing interventions to promote physical activity in older rural women. © 2008 Wiley Periodicals, Inc. Res Nurs Health 31:501–513, 2008

Keywords: physical activity; women; rural

Physical activity rates are lower for women than men, and these rates decline further with age (Caspersen, Pereira, & Curran, 2000). Older rural women, defined as ≥ 65 years, are less physically active than older urban women (Scharff, Homan, Kreuter, & Brennan, 1999). Large numbers of older women are clustered in predominantly rural communities, where the mean age is increasing more rapidly than in urban areas (U.S. Department

of Agriculture [USDA], 2005). Older rural-dwelling women often have limited financial resources, endure social isolation, and have fewer community health resources than do older urban-dwelling women (Carruth & Logan, 2002). These factors may contribute to their lower rates of physical activity when compared to their urban counterparts (Wilcox, Castro, King, Housemann, & Brownson, 2000). The overall purpose of this

The research was conducted at the University of Illinois at Chicago. The authors wish to thank the DeKalb County Farm Bureau for assisting in this research. The authors also wish to acknowledge gratefully the professional editorial contribution of Kevin Grandfield. The preparation of this manuscript was supported by The Center for Reducing Risks in Vulnerable Populations, P30 NR009014.

Contract grant sponsor: NIH, NINR; Contract grant numbers: T32 NR07075, NINRF32, NR08070.

Contract grant sponsor: Sigma Theta Tau International, Alpha Lambda Chapter.

Contract grant sponsor: Illinois Rural Health Association.

Correspondence to Donna J. Plonczynski.

*Assistant Professor.

**Professor and Endowed Independence Foundation Chair in Nursing.

†Professor and Chair.

‡Associate Professor.

Published online 2 April 2008 in Wiley InterScience
(www.interscience.wiley.com). DOI: 10.1002/nur.20282

study was to describe and examine factors related to the lifestyle physical activity behaviors (household, leisure, and occupational) of older women living in a non-metropolitan rural county.

Total physical activity for women includes behaviors within the household, leisure, and occupational domains and is referred to as *lifestyle physical activity* (Wilbur, Holm, & Dan, 1993). Much of the existing physical activity research on older women is focused on leisure time physical activity (U.S. Department of Health and Human Services [USDHHS], 1996). When physical activity is defined narrowly as structured leisure time behaviors only, it may be underestimated, and opportunities to enhance physical activity may be overlooked (King, 1994). For example, in a study of Dutch elders, Parkatti, Deeg, Bosscher, and Launer (1998) found that older women were more active than men when household activities were included in physical activity measurement. Thus, to create an evidence base for developing physical activity interventions for women living in predominantly rural areas, one must consider the full range of lifestyle activities as well as factors that influence their performance (Plonczynski, 2003).

The Cox interaction model of client health behavior (Cox, 1982, 2003) is a middle-range nursing theoretical framework that can be used to specify the multiple background and intrapersonal characteristics that are potentially predictive of behavior, behavior change, and associated health outcomes. The model has been used to study relationships between background and intrapersonal influences for a variety of health

behaviors, including midlife women's adherence to a walking program (Wilbur, Miller, Chandler, & McDevitt, 2003) and physical activity in older women with rheumatoid arthritis (Semanik, Wilbur, Sinacore, & Chang, 2004).

In the model of physical activity behavior as adapted for this study, the relatively static background characteristics include demographics, environment, social support, and current psychological and physical health (Fig. 1). The dynamic intrapersonal characteristics include motivational factors and self-efficacy, and are influenced by the background characteristics. Thus, intrapersonal characteristics have a more direct effect on physical activity than background characteristics, and they may be an optimal target for interventions.

Generalizing results from the existing body of literature on physical activity of rural dwellers is difficult because the term *rural* is variously defined. Nine studies were identified in which physical activity of older rural women was examined. In six of these studies, the setting was referred to simply as *rural* (Arcury et al., 2006; Dye & Wilcox, 2006; Osuji, Lovegreen, Elliott, & Brownson, 2006; Parks, Housemann, & Brownson, 2003; Sanderson, Littleton, & Pulley, 2002; Walker, Pullen, Hertzog, Boeckner, & Hageman, 2006). In one study the setting was described as *agricultural* (Swenson, Marshall, Mitulich-Gilbertson, Baxter, & Morgenstern, 2005). Additionally, *rural* may be described in terms of distance from a metropolitan area (Aronson & Oman, 2004; Eyler & Vest, 2002). Less frequently, *rural* is defined with population census data

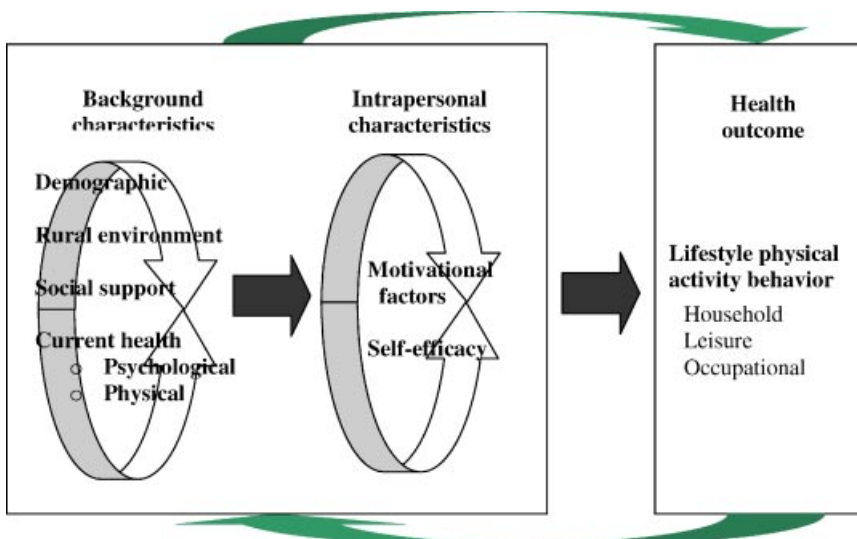


FIGURE 1. Model of physical activity behavior.

(Wilcox, Bopp, Oberrecht, Kammermann, & McElmurray, 2003). The U.S. Census Bureau (USCB, 2002) classifies *rural* as all areas outside of urban areas and uses the term *non-metropolitan*, which includes small cities with populations less than 50,000. This latter is the definition used in this study of physical activity of older women. No previous study of lifestyle physical activity behaviors was found of older women living in a non-metropolitan rural county defined by population density, comparing the women from the small cities to those residing on farms or in smaller communities.

Multiple background characteristics are associated with lower levels of leisure physical activity in older rural women, including increased age (Swenson et al., 2005), lower income (Sanderson et al., 2002) and less education (Wilcox et al., 2003). Environmental characteristics are the primary barriers to physical activity for older rural women (Aronson & Oman, 2004; Eyler & Vest, 2002; Parks et al., 2003), and they report more environmental barriers to physical activity than do their urban counterparts (Sanderson et al.). Social support, including positive influences from friends or family, is related to higher leisure physical activity in both urban and rural older women (Aronson & Oman; Eyler & Vest; Parks et al.). Also, older rural women who report better physical health are more physically active in their leisure (Arcury et al., 2006; Sanderson et al.), as are those with better psychological health (Wilcox et al., 2003).

Intrapersonal characteristics include motivation, which for older adults has been operationalized as *motivational factors* (Melillo et al., 1996; Melillo, Williamson, Futrell, & Chamberlain, 1997). These motivational factors include enjoying the activity itself, as well as enjoying the outcome of physical activity, such as an improvement in health. Osuji et al. (2006) found that for rural women between the ages of 18–94 ($M = 48$) years, those with more motivational factors to exercise reported being more active. Also, older rural women were more likely to exercise if they could identify motivating factors (Dye & Wilcox, 2006).

The second intrapersonal characteristic is self-efficacy, which is the pivotal concept in Bandura's social cognitive theory (Bandura, 1997). Self-efficacy is defined as the confidence in one's ability to accomplish a goal, in this case, to be physically active. Higher self-efficacy for physical activity has consistently been associated with increased leisure physical activity in older women (Walker et al., 2006; Wilcox et al., 2003).

Although the components in the model of physical activity behavior are supported by research, there are few studies that include a multivariate evaluation of background and intrapersonal characteristics related to physical activity behaviors and even fewer in which these behaviors have been evaluated in older rural women (Conn, Valentine, & Cooper, 2002; King, 2001). The current study was developed to address these gaps in the literature. The research questions were:

1. What are the lifestyle physical activity behaviors (household, leisure, and occupational) of older women residing in one non-metropolitan rural county?
2. Is there a difference in levels of lifestyle physical activity behavior and in background and intrapersonal characteristics between older women living within the two small cities and those residing outside of those cities?
3. What are the relationships between the background and intrapersonal characteristics and lifestyle physical activity behavior of older rural women?

METHODS

Design, Sample, Setting

A cross-sectional face-to-face survey research design was used. Participant inclusion criteria were women between the ages of 65 and 85 years who resided in their own home located in one northern, rural county of Illinois, were cognitively intact, self-described as able to walk, had at least one chronic health problem, and were English-speaking. At least one chronic health problem was required because physical activity is particularly important in this group of women (USDHHS, 1996). Cognitive function was assessed during screening using four questions developed for older adults in the community (Paveza et al., 1990).

This county is labeled *non-metropolitan* because it has no city with a population of 50,000 or greater (USCB, 2007). This terminology includes counties that are both more and less urbanized. The population of the county sampled for this study resides both within the two small cities (populations of 39,228 and 12,461) and outside them, which includes farms and 12 smaller communities (populations 100–6,509) according to the last census (USCB, 2007). The county is 91% farmland (USDA, 2005) and is identified as primarily *agricultural* by the overall county plan

(DeKalb County Board, 2003). The county has a strong historic, economic, and social basis of farming (Mogren, 2005). Therefore, for the purposes of this study we refer to the county as rural.

In addition to having a slightly lower median household income than the overall state (\$45,828 vs. \$46,590, respectively), the county residents lose economic security as they age, with a declining median income of \$41,332 (65–74 years) to \$27,152 (≥ 75 years; USCB, 2007). Eleven percent of the county population is 65 years or older, as compared to 7.2% for the state. The ethnic distribution of the women in the county is 98% Caucasian, 2% Hispanic, and less than 1% other.

A power analysis was conducted to estimate the sample size needed for this study. Previous research that included multiple background and intrapersonal characteristics of physical activity behavior revealed a medium effect size f^2 of approximately .10 (MacLeod and Stewart, 1994 effect size of .15; Wilbur et al., 2003 effect size of .08). A total sample size of 176 was needed to find this effect with 80% power using an alpha of .05.

The women were recruited through announcements in local newspapers and church bulletins, flyers posted in pharmacies and clinics, and community presentations within and surrounding all of the county's cities, towns, and villages. Gender and age were the only inclusion criteria included on the promotional material. At first contact, either in person or by telephone, an

explanation of the study was given. Those women who expressed interest were screened to see if they met the inclusion criteria. Of the 177 women screened, 176 were eligible and willing to participate. One woman did not finish the screening questionnaire, citing time constraints. All women who responded to the promotional materials met the inclusion criteria.

Half of the women ($n = 88$) participants in this study lived within the city limits of the two small cities, and the other half lived on farms or in smaller communities (Table 1). The women reported an average of 3.44 chronic disorders ($SD 1.48$; Range 1–10), with arthritis (76%) and hypertension (50%) as the most frequent. The mean age for the women was 74 years ($SD 5.61$; Range 65–85). Forty-eight percent of the women were married, and the majority of those women not married (69%, $n = 63$) were widowed. Less than half (41%) of the women worked outside their homes, and 44% had an annual family income of less than \$30,000. There were no significant differences in demographic characteristics between those who lived within or outside of the two small cities.

Measures

Lifestyle physical activity behavior. Three instruments that reflect self-reported energy expenditure over the previous 12 months for

Table 1. Physical Activity, Background, and Intrapersonal Characteristics by Rural Environment

	Overall ($N = 176$), M (SD)	Range	Rural environment, M (SD)	
			Outside two cities ($n = 88$)	Within two cities ($n = 88$)
Physical activity				
Household (METs)	158.99 (71.17)	34–410	170.11 (71.22)	147.87 (69.75)*
Leisure (METs)	77.75 (37.35)	11–179	71.71 (36.87)	83.78 (37.04)*
Occupational (METs) ^a	31.30 (38.23)	2–231	34.18 (42.28)	28.72 (34.57)
Overall (METs)	249.54 (78.45)	96–513	255.03 (82.70)	244.06 (74.03)
Background				
Demographic				
Education (years)	14.07 (2.57)	7–19	13.92 (2.53)	14.23 (2.60)
Social support	13.72 (3.41)	4–20	14.18 (3.70)	13.26 (3.05)
Current health				
Psychological health	55.02 (7.99)	24.77–70.88	55.04 (7.08)	55.00 (8.84)
Physical health	44.51 (10.33)	15.72–61.19	43.98 (9.86)	45.03 (10.81)
BMI (kg/m^2)	28.21 (6.08)	16.27–56.63	28.54 (6.20)	27.89 (5.98)
Intrapersonal				
Motivational factors	34.75 (4.04)	21–40	34.97 (4.12)	34.53 (3.98)
Self-efficacy	70.13 (25.29)	0–124	69.34 (25.97)	70.91 (24.72)

BMI, body mass index.

^aOccupational METs were calculated on those women with occupational activities ($n = 72$).

* $p < .05$.

household, leisure, and occupational dimensions were used to measure physical activity behavior. The 32-item *Household Physical Activities* instrument was developed for a study of midlife women (Wilbur et al., 1993). For this study it was shortened to include 28 activities related to housework, yard work, and caretaking activities. Leisure activities were measured by a shortened version of the *Minnesota Leisure* instrument (43 activities), which reflects activities appropriate for elderly women (Kriska & Caspersen, 1997; Taylor et al., 1978). The *Tecumseh Occupational Activity* instrument includes 10 activities performed at work, including sitting and walking while carrying less than 2 pounds (Reiff et al., 1967). A number of individual items were deleted from each of the instruments because they represented activities that exceeded the capacities of older women. For example, one of the four removed from the household instrument was "standing or walking carrying objects 85–100 lb," one of the nine items removed from the leisure questionnaire was "mountain climbing," and one of the six items removed from the occupational questionnaire was "moving or pushing heavy objects 75 lb or more." Reliability and validity of the instruments were determined for the household and leisure instruments (Wilbur et al., 1993). Two-week agreement for midlife women on doing the activity was 80% or higher for all but five of the activities. Validity of the household and leisure instruments has been supported by significant correlations with estimated oxygen uptake based on a submaximal aerobic fitness test on a bicycle ergometer ($r = .14$, $p < .05$, and $.21$, $p < .05$, respectively). Known groups validity of the occupational instrument was demonstrated by significant differences between occupational groups known to differ in physical activity levels (Wilbur, Miller, Dan, & Holm, 1989). Mean energy expenditure for office workers was lower than for teachers and nurses.

Each physical activity had a metabolic equivalent (MET) value based on established intensity codes (Ainsworth et al., 2000). Low intensity is less than 3.0 METs; moderate intensity, 3.0–6.0 METs; and high/vigorous intensity is more than 6.0 METS (Pate et al., 1995). For all activities, the woman provided the number of months in which the activity was performed, the number of occasions the activity was performed each month, and the average duration of the activity per occasion. Average percent time spent at each level of intensity (light, moderate, high/vigorous) was calculated for each of the

physical activity dimensions as well as for overall physical activity.

The MET value, number of months, number of occasions and average duration for each item were multiplied for each dimension (household, leisure, and occupational) and divided by 48, the number of weeks per year considered for the analyses (Montoye, Kemper, Saris, & Washburn, 1996). Household, leisure, occupational and overall energy expenditure in mean METs/week was calculated by the following formula:

$$\frac{[S(TiMiFi)]^k}{I = 1}$$

where I is the activity; k is the number of activities; T is the average duration of activity in hours; M is the number of months activity performed; and F is the average number of occasions per month.

Rural environment. For this study, *rural environment* was defined dichotomously. The women living within the two small cities were compared with those living on farms or in smaller communities of this county.

Social support. The Social Support for Physical Activity Scale has four items that are scored on a five-choice Likert-type scale, from 1 (*strongly disagree*) to 5 (*strongly agree*) in response to a support statement (O'Brien Cousins, 1995). Two items are reverse-scored. The questions inquire about family, social group, friend, and health provider support for physical activity. The sum of the scores was used in the analyses, with higher scores indicating higher social support. Test-retest reliability was .79 (O'Brien Cousins). Internal consistency was not measured for this instrument because it sums various independent sources of support.

Psychological health. The mental health subscale of the Medical Outcomes Study Short Form-12 (SF-12) was used to evaluate vitality, social functioning, role limitations because of emotional issues, and general mental health (Ware, Kosinski, & Keller, 1996). For example, one item queries the amount of time in the past 4 weeks that the participant has felt peaceful. This instrument consists of six items, including multiple-choice and Likert-type scales. For the Likert-type questions, 1 is low and 6 is high. Each question is weighted according to national norms by age and sex. The mean score was 52.10 (SD 9.53, Range 19–70) for older adults 65–74 years old and 50.06 (SD 10.94, Range 22–69) for adults 75 years and older (Ware, Kosinski,

& Keller, 1998). The coefficient alpha for the mental health subscale was .76, and validity was supported by strong correlations with the mental component summary scales of the SF-36, $r = .97$ (Ware et al., 1998). The coefficient alpha for this study was .71.

Physical health. The physical health subscale of the SF-12 (Ware et al., 1996) and body mass index (BMI) were used to measure current physical health. The SF-12 measures physical function, role limitation because of physical issues, pain, and general health perception. The physical subscale consists of six multiple-choice and forced-choice Likert-type questions, scored similarly to the mental health subscale. The mean score was 43.65 (SD 11.02, Range 13–59) for older adults 65–74 years and 38.68 (SD 11.04, Range 17–57) for adults 75 years and older (Ware et al., 1998). Test–retest reliability for the subscale was .89, and the validity was supported by correlations with the physical component summary scales of the SF-36, $r = .67$. Internal consistency was .79 in this study.

Weight was measured with a Seca brand 840 scale (Hamburg, Germany) that was designed for the use of visiting nurses. This instrument registers within 1 kg of body weight (Seca Company, 1997). The participant's height was measured without shoes or outerwear on a stadiometer that was affixed to the wall at each location. The accuracy of its placement was checked twice before each use. The BMI was calculated using weight in kilograms and height in meters squared (kg/m^2).

Motivational factors. The Motivators Subscale of the Physical Fitness and Exercise Activity Levels of Older Adults Scale was used (Melillo et al., 1997). It has 10 statements with items thought to motivate or enhance physical activity, such as "I am physically active to keep myself healthy," and "I prefer to be physically active with others." Participants indicate on a 4-point Likert-type scale how much they agree with each statement from *strongly disagree* to *strongly agree*. Responses are summed, and scores indicate the extent to which participants perceive motivation for physical activity. The instrument was modified by substituting "physical activity" for each item that included the word "exercise." This scale demonstrated a coefficient alpha of .88 and a test–retest reliability of .59; validity was established with a significant predictive correlation of .22 with exercise frequency (Melillo et al., 1997). The coefficient alpha for this study was .80.

Self-efficacy. The 11-item Barrier Efficacy for Physical Activity measures the participant's confidence in overcoming barriers to physical activity,

such as lacking interest or being bored (McAuley, Courneya, Rudolph, & Lox, 1994). It is scored on a 0–100% scale, with the mean score used in the analyses. Validity was demonstrated by positive correlations with leisure activity (McAuley & Mihalko, 1998). The coefficient alpha in this study was .88.

Procedure

The study was approved by the University Institutional Review Board. Following eligibility screening either in person or over the telephone, a time and a location convenient for the participant were set for the survey interview. Most interviews took place in the women's homes (64%), with the rest at the county farm bureau (24%), community centers (4%), or rural churches (8%). After signing the informed consent, participants were read the questionnaires to eliminate any misunderstanding of the measures and to include anyone with limited literacy skills or vision. There was a refreshment break approximately 30 minutes into the interview. On average, each survey interview lasted nearly 2 hours (Range 60–140 minutes).

After completion of the interview, the investigator measured weight, height, and blood pressure (BP). Women with elevated BPs were encouraged to seek care from their health care providers. All women with elevated BPs indicated that they had a primary care provider. Each participant then received a 100-page booklet that highlighted the benefits of physical activity along with a card with her BP reading.

Analysis

Means, standard deviations, and frequencies were used to describe all variables. Student's t -tests were used to identify differences in background and intrapersonal characteristics and physical activity behavior for women living within or outside of the two county cities. Each physical activity dimension (household, leisure, occupational) and the overall activity were regressed on the background characteristics. To partial out the variance in physical activity behavior explained by intrapersonal characteristics beyond that of the background characteristics, a regression was conducted on the residuals (or error variance) of the background regressions (Draper & Smith, 1981; Weisberg, 1985). The residuals of these regression analyses are the variance in physical activity behavior that may be influenced by the intrapersonal characteristics of motivation or self-efficacy.

RESULTS

Lifestyle Physical Activity Behavior and Rural Environment

MET scores were highest for household activity and lowest for occupational activity (Table 1). All women reported household and leisure physical activity behaviors, but only 72 women (41%) reported occupational physical activity behaviors. Three of the women who reported occupational activities worked on their family farms, two sold farmstand produce, and the other supervised corn drying in the late summer. When MET scores from household and leisure physical activities were combined, on average 67% of METs were obtained from household activities, and 33% were obtained from leisure activities.

Closer examination revealed that the majority of the energy expended in household and leisure physical activities was associated with low-intensity activities (65%, 91%, respectively), with lesser amounts in moderate-intensity activities (35%, 9%, respectively), and negligible effort in high-intensity activities (0%, .4%, respectively). Of the 72 women who worked or volunteered, all participated in the occupational dimension in low-intensity activities; a minority (41%) also participated in moderate-intensity activities.

The most common household activities were sitting with light work such as paying bills (100%) and standing with light work such as supervising children (100%). The most frequently performed leisure activities were low-intensity activities (100%) such as reading, while smaller numbers participated in stretching (62%) and walking for exercise (51%). For those who worked or volunteered ($n = 72$, 41%), the most common occupational dimension activities reported were sitting with light work such as typing (82%) and standing with light work such as filing (36%).

Women living outside of the two cities had higher MET scores for their household activity ($t(1, 174) = 2.09$, $p < .05$); and women within the two cities had higher MET scores for their leisure activity ($t(1, 174) = 2.17$, $p < .05$; Table 1). There was no difference, however, between the groups on occupational energy expenditure.

Background and Intrapersonal Characteristics

The participants had an average educational attainment of 14 years (Table 1). Most of the

women (65%) had completed some education beyond high school. Overall, social support was 13.7 of a possible 20. Approximately half of the women agreed or somewhat agreed that at least one person (61%), a social group (51%), or health care provider (53%) supported their being physically active. A majority of the women (73%) reported that their family was physically active.

Psychological health, as measured by the SF-12 mental health subscale, indicated moderately good psychological health. Most of the women (82%) reported that their emotional health did not interfere with their work activities. The mean score on the SF-12 for physical health also indicated moderately good physical health. A majority of the women felt that their overall physical health did not interfere with stair climbing (85%), work (63%), or the type of work in which they participated (60%). Just over half of the women (57%) rated their health as *very good* or *excellent*.

The average motivation score was 34.75 of a possible 40. The participants perceived and/or acknowledged a substantial number of motivational factors for physical activity behavior. Ninety-eight percent of the women reported that physical activity behavior resulted in feeling better overall and provided a sense of accomplishment; 94% felt more energetic when physically active. On average, these women reported 70% confidence or self-efficacy in their ability to overcome barriers to physical activity. The most frequently identified barriers were lack of interest in physical activity (89%) and dislike of physical activity (84%). There were no significant differences between women living within or outside of the two cities on either background or intrapersonal characteristics.

Physical Activity Behavior and Background and Intrapersonal Characteristics

The regression of MET scores for household physical activity behavior on the background characteristics was significant (Table 2). The background characteristics accounted for 6.2% of the variability in household physical activity. Social support had a significant independent effect; as social support increased, household activity increased.

The regression of leisure physical activity on the background characteristics was also significant, explaining 12% of the variability in leisure behavior (Table 3). Rural environment, physical

Table 2. Multiple Regression of Household Physical Activity on Background Characteristics

Background characteristics	<i>B</i>	<i>SE B</i>	<i>Beta</i>	<i>t</i>
Demographic				
Education	3.70	2.12	.13	1.74
Rural environment	19.64	10.54	.14	1.86
Social support	4.45	1.56	.21	2.86*
Current health				
Psychological	.06	.67	.01	.08
Physical	.14	.53	.02	.26
BMI	-.34	.91	-.03	.38

BMI, body mass index.

$F(6, 169) = 2.92, p < .05$; Adjusted $R^2 = .06$.

* $p < .05$.

health, and psychological health each had significant independent negative effects. The following background characteristics predicted leisure physical activity: living in one of the small cities, reporting poorer physical health, and reporting poorer psychological health. The regressions of occupational physical activity and overall physical activity METs on the background characteristics were not significant.

The regression of the residuals of the household physical activity behaviors (partialing out the background characteristics) on the intrapersonal characteristics was not significant. Therefore, the intrapersonal characteristics did not explain household activity behavior beyond that explained by the background characteristics. The regression of the residuals of leisure physical activity behavior on the intrapersonal characteristics was significant (Table 4). Perceived motivational factors had a significant independent effect on leisure physical activity. Contrary to expectations, higher perceived motivational factors were associated with less leisure physical activity. The

Table 3. Multiple Regression of Leisure Physical Activity on Background Characteristics

Background characteristics	<i>B</i>	<i>SE B</i>	<i>Beta</i>	<i>t</i>
Demographic				
Education	-.48	1.08	-.03	.44
Rural environment	-12.78	5.37	-.17	2.38*
Social support	-.91	.79	-.08	1.15
Current health				
Psychological	-.84	.34	-.18	2.45*
Physical	-.96	.27	-.27	3.56*
BMI	.65	.46	.11	1.41

BMI, body mass index.

$F(6, 169) = 4.78, p < .05$; Adjusted $R^2 = .12$.

* $p < .05$.

intrapersonal characteristics did not further explain the variance in either occupational dimension or overall physical activity after the background characteristics were partialled out.

DISCUSSION

This sample of women from a non-metropolitan rural county reported a low level of lifestyle physical activity, and most lifestyle physical activity behaviors were within the household dimension. Social support explained a significant portion of household physical activity behavior, and the proposed mediating variables made no further contribution to the explained variance. Psychological and physical health, as well as living within the two cities, explained a significant portion of leisure physical activity behavior. Those women with poorer psychological and physical health were more active during their leisure time. Motivating factors explained a significant portion of the variance in leisure physical activity behavior over and above that which was attributed to background variables, but in an unexpected direction. Those women with more motivating factors were less active during their leisure time.

Overall, 64% of the women's energy expenditure was from the household dimension. This finding is consistent with that of Semanik et al. (2004), who found that household activity accounted for 67% of the daily energy expenditure within a population of older urban women with rheumatoid arthritis. The older rural women in the current study favored household physical activity, but they reported a relatively low volume of physical activity in this dimension, suggesting that there is room to increase household physical activity. The results suggest that interventions to promote physical activity in this group of women might be most successful if they target household physical activity.

The mean overall weekly energy expenditure of 268 METs calculated in the current study closely approximates the 270 METs identified in a 7-day recall for 24 U.S. working women with a mean age of 40 years (Speck & Looney, 2006). However, it is slightly lower than the 287 METs from a study of 303 midlife and older Swedish women aged 56–75 ($M = 65$) years (Orsini, Bellocco, Bottai, Pagano, & Wolk, 2007). These results do not differ greatly from those of studies that include younger women. Therefore, the understanding of physical activity of rural women may be expanded by further research

Table 4. Regressions of Leisure Physical Activity Residuals on Intrapersonal Characteristics

Regression	<i>F</i>	<i>df</i>	<i>p</i>	Variable	<i>B</i>	<i>SE B</i>	<i>Beta</i>	<i>t</i>
Leisure residuals on intrapersonal characteristics	3.21	2,173	< .05	Motivational factors	-.04	.02	-.18	2.21*
				Self-efficacy	.01	.01	.16	1.97

Adjusted $R^2 = .03$.

* $p < .05$.

exploring the effects of aging on their lifestyle physical activity behaviors.

Women living in the more rural environments (outside of the two small cities) had somewhat higher energy expenditure in the household dimension than the women who resided in the two small cities. The observed difference was relatively small, but current thinking from the American College of Sports Medicine and the American Heart Association suggests that even minor increases in physical activity levels have positive health benefits (Nelson et al., 2007). Brownson et al. (2000) also found that rural women spent more time doing household physical activity than the women who resided in more densely populated metropolitan communities. This higher level of household activity in rural women may be due to limited access to and the higher cost of services that support household functions. For women in agricultural areas, restaurants are at a greater distance, and food delivery may not be available. The women outside of the small cities may not be offered the same level of city services such as yard and leaf collection, and garbage removal as women within the small cities.

Higher levels of social support for physical activity usually are associated with higher levels of leisure time physical activity (Brownson, Baker, Housemann, Brennan, & Bacak, 2001). A similar relationship was observed with the older rural women in this study, but the positive relationship was between social support and household physical activity, their dominant form of physical activity, rather than leisure time physical activity. This may reflect a high level of regard for household work, especially in the more rural communities. These women likely received a great deal of family and community reinforcement for the household work, yard work, and childcare activities that support rural farm life. Therefore, household work becomes their physical activity of choice.

The SF-12 scores for psychological (55) and physical (44) health of these rural women were both slightly higher than published norms for

adults older than 65 years (52–50 and 43–38, respectively), suggesting good health (Ware et al., 1998). Psychological health was considerably higher when compared to the mean of 37 in a study of 17,000 patients at medical appointments across the country, but their physical health was similar to the mean score of 40 in that sample (Sherbourne, Sturm, & Wells, 1997). The mean BMI for participants in this study was 28.2, corresponding to the U.S. national findings for women aged 65–74 years (29.2) and those over age 75 (26.8; National Center for Health Statistics, 2007).

Women with poorer health participated in more leisure physical activity. This is an unusual finding, but consistent with that of Brownson et al. (2001), who found that, for low-income residents 18 years and older in a cross-sectional study across the U.S., poor physical health corresponded with higher levels of physical activity behavior. Moreover, Scharff et al. (1999) found that among older rural women recruited from four community-based medical clinics in Missouri, those who perceived a higher risk of myocardial infarction were more physically active than those who perceived lower risk. The women in our study with poorer physical health may have perceived a heightened risk for worsening disease and responded to this risk with increased physical activity in their leisure time. The unexpected relationship between psychological health and leisure physical activity is not so easily explained and requires further study.

The women perceived a considerable number of motivational factors for physical activity, but the role of motivation for engaging in physical activity was not clear. Their motivating factors were similar to those reported in a study of physically active older women who identified enjoyment and fun as reasons for being more physically active (Merrill, Shields, Wood, & Beck, 2004). The health benefit from physical activity also was described as a motivator in another study of older rural women (Scharff et al., 1999). However, in the current study, the women who recognized more motivating factors were less active during their

leisure time, and their motivation had no measurable effect on either their household activities or overall physical activity. This finding is in contrast to results of previous studies, in which either a positive relationship (Wilcox, Richter, Henderson, Greaney, & Ainsworth, 2002) or no relationship (Litt, Kleppinger, & Judge, 2002) was found between motivators and physical activity behavior. In this study, motivating factors accounted for a small portion of the variance in leisure physical activity. It is possible that the women's definition of being physically active reflected the busyness of their lives and did not reflect the true volume of physical activity. A similar phenomenon was observed in midlife African American women (Wilbur, Chandler, Dancy, Choi, & Plonczynski, 2002).

Consistent with motivational factors, the mean self-efficacy score was moderately high (70 on a scale of 0–100), suggesting that the women were confident of their ability to overcome barriers to physical activity behavior, similar to results in a study of older adults participating in aerobic exercise (mean self-efficacy score 6.6 on a scale of 0–10; Resnick & Jenkins, 2000). The women were least confident in their ability to remain physically active when they lacked interest in the physical activity behavior or disliked the activity. Similarly, a study of younger women found those women who were less active reported that they enjoyed the activities less (Kull, 2002). Unlike in earlier studies (McAuley et al., 1994; Wilbur et al., 2003), no relationship was found between self-efficacy for overcoming barriers to physical activity and the level of physical activity, which may be due to a high ceiling effect.

For future generations, Title IX (U.S. Department of Labor, 1972) has addressed the issue of exposing girls to sports in school, but the women in this study likely had little experience with organized leisure physical activities. Despite more recent media exposure to physically active women, the media rarely portray creative ways for rural women to be more physically active. Thus, older rural women may perceive leisure physical activity as something for the young or those residing in urban environments. Self-report of good physical and mental health notwithstanding, a majority of the women were overweight or obese and could benefit from a more physically active lifestyle. These women, however, had considerable exposure to household work, for which they received social support, perhaps reflecting a high level of regard for household work as women's traditional contribution to the home. Thus, the household may be a focus for intervention to

encourage moderate-intensity activities to achieve health benefits. The encouragement of walking when doing chores or working at a more brisk pace than usual may be a way to improve health in women with sedentary lifestyles. Because these women already respond positively to social support for their household activities, they may respond similarly to increased social support for leisure physical activity behavior.

Acknowledged limitations to the study include the volunteer sample and the social desirability associated with self-reported physical activity behavior questionnaires (Masse et al., 1998). These factors limit the generalizability of the results. Although the conventionally accepted level for internal consistency is $\geq .70$ (Nunnally & Bernstein, 1994), our measures for psychological health, physical health, and motivational factors were on the low end of acceptable.

In summary, these older rural women were not physically active outside of their homemaking, which was predominately low-intensity. Increased household physical activity was significantly explained by the background characteristics and was independently associated with positive social support and living in the more rural areas. A higher level of leisure physical activity was associated with the background and intrapersonal characteristics, but the effects of motivation and psychological health were in an unexpected direction and require further study. This research highlights the importance of household physical activity and the contribution of social support for household physical activity, both of which may be important in developing interventions to promote physical activity in older rural women.

REFERENCES

- Ainsworth, B.E., Haskell, W.L., Whitt, M.C., Irwin, M.L., Swartz, A.M., Strath, S., et al. (2000). Compendium of physical activities: An update of activity codes and MET intensities. *Medicine & Science in Sports & Exercise*, 32, S498–S516.
- Arcury, T.A., Snively, B.M., Bell, R.A., Smith, S.L., Stafford, J.M., Wetmore-Arkader, L.K., et al. (2006). Physical activity among rural older adults with diabetes. *Journal of Rural Health*, 22, 164–168.
- Aronson, R.E., & Oman, R.F. (2004). Views on exercise and physical activity among rural-dwelling senior citizens. *The Journal of Rural Health*, 20, 76–85.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman.
- Brownson, R.C., Baker, E.A., Housemann, R.A., Brennan, L.K., & Bacak, S.J. (2001). Environmental and policy determinants of physical activity in the

- United States. *American Journal of Public Health*, 91, 1995–2003.
- Brownson, R.C., Eyster, A.A., King, A.C., Brown, D.R., Shyu, Y.L., & Sallis, J.F. (2000). Patterns and correlates of physical activity among U.S. women 40 years and older. *American Journal of Public Health*, 90, 264–270.
- Carruth, A.K., & Logan, C.A. (2002). Depressive symptoms in farm women: Effects of health status and lifestyle characteristics, behaviors, and beliefs. *Journal of Community Health*, 27, 213–228.
- Caspersen, C.J., Pereira, M.A., & Curran, K.M. (2000). Changes in physical activity patterns in the United States, by sex and cross-sectional age. *Medicine & Science in Sports & Exercise*, 32, 1601–1609.
- Conn, V., Valentine, J., & Cooper, H. (2002). Interventions to increase physical activity among aging adults: A meta-analysis. *Annals of Behavioral Medicine*, 24, 190–200.
- Cox, C.L. (1982). An interaction model of client health behavior: Theoretical prescription for nursing. *Advances in Nursing Science*, 91, 41–56.
- Cox, C.L. (2003). A model of health behavior to guide studies of childhood cancer survivors. *Oncology Nursing Forum*, 30, E2–E9.
- DeKalb County Board. (2003). DeKalb County: Unified comprehensive plan. Retrieved January 21, 2008, from <http://www.dekalbcounty.org/Planning/CompPlan/UnifiedCompPlan.pdf>.
- Draper, N., & Smith, H. (1981). *Applied regression analysis* (2nd ed.). New York: John Wiley.
- Dye, C.J., & Wilcox, S. (2006). Beliefs of low-income and rural older women regarding physical activity: You have to want to make your life better. *Women & Health*, 43, 115–134.
- Eyster, A.A., & Vest, J.R. (2002). Personal, social, and environmental correlates of physical activity in rural midwestern white women. *Women & Health*, 36, 111–121.
- King, A.C. (1994). Clinical and community interventions to promote and support physical activity participation. In R.K. Dishman (Ed.), *Advances in exercise adherence* (pp. 183–212). Champaign, IL: Human Kinetics.
- King, A.C. (2001). Interventions to promote physical activity by older adults. *Journals of Gerontology*, 56, 36–46.
- Kriska, A.M., & Caspersen, C.J. (1997). A collection of physical activity questionnaires for health related research. *Medicine & Science in Sports & Exercise*, 29, S62–S72.
- Kull, M. (2002). The relationships between physical activity, health status and psychological well-being of fertility-aged women. *Scandinavian Journal of Medicine & Science in Sports*, 12, 241–247.
- Litt, M.D., Kleppinger, A., & Judge, J.O. (2002). Initiation and maintenance of exercise behavior in older women: Predictors from the social learning model. *Journal of Behavioral Medicine*, 25, 83–97.
- MacLeod, P., & Stewart, N.J. (1994). Predictors of participation in a peer-led exercise program for senior women. *Canadian Journal of Nursing Research*, 26, 13–25.
- Masse, L.C., Ainsworth, B.E., Tortolero, S., Levin, S., Fulton, J.E., Henderson, K.A., et al. (1998). Measuring physical activity in midlife, older, and minority women: Issues from an expert panel. *Journal of Women's Health*, 7, 57–67.
- McAuley, E., Courneya, K.S., Rudolph, D.L., & Lox, C. (1994). Enhancing exercise adherence in middle-aged males and females. *Preventive Medicine*, 23, 498–506.
- McAuley, E., & Mihalko, S.L. (1998). Measuring exercise-related self-efficacy. In J.L. Duda (Ed.), *Advances in sport and exercise psychology measurement* (pp. 371–390). Morgantown, WV: Fitness Information Technology, Inc.
- Melillo, K.D., Futrell, M., Williamson, E., Chamberlain, C., Bourque, A.M., MacDonnell, M., et al. (1996). Perceptions of physical fitness and exercise activity among older adults. *Journal of Advanced Nursing*, 23, 542–547.
- Melillo, K.D., Williamson, E., Futrell, M., & Chamberlain, C. (1997). A self-assessment tool to measure older adult's perceptions regarding physical fitness and exercise activity. *Journal of Advanced Nursing*, 25, 1220–1226.
- Merrill, R.M., Shields, E.C., Wood, A., & Beck, R.E. (2004). Outcome expectations that motivate physical activity among world senior games participants. *Perceptual and Motor Skills*, 99, 1277–1289.
- Mogren, E.W. (2005). *Native soil: A history of the DeKalb County Farm Bureau*. DeKalb, IL: Northern Illinois Press.
- Montoye, H., Kemper, H., Saris, W., & Washburn, R. (1996). *Measuring physical activity and energy expenditure*. Champaign, IL: Human Kinetics.
- National Center for Health Statistics. (2007). *Health, United States, 2007*. Washington, DC: U.S. Government Printing Office.
- Nelson, M.E., Rejeski, W.J., Blair, S.N., Duncan, P.W., Judge, J.O., King, A.C., et al. (2007). Physical activity and public health in older adults: Recommendations from the American College of Sports Medicine and the American Heart Association. *Medicine & Science in Sports & Exercise*, 39, 1435–1445.
- Nunnally, J.C., & Bernstein, I.H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw Hill.
- O'Brien Cousins, S. (1995). Social support for exercise among elderly women in Canada. *Health Promotion International*, 10, 273–282.
- Orsini, N., Bellocco, R., Bottai, M., Pagano, M., & Wolk, A. (2007). Reproducibility of the past year and historical self-administered total physical activity questionnaire among older women. *European Journal of Epidemiology*, 22, 363–368.
- Osuji, T., Lovegreen, S.L., Elliott, M., & Brownson, R.C. (2006). Barriers to physical activity among

- women in the rural midwest. *Women & Health*, 44(1), 41–55.
- Parkatti, T., Deeg, D.J., Bosscher, R.J., & Launer, L.L. (1998). Physical activity and self-rated health among 55- to 89-year-old Dutch people. *Journal of Aging and Health*, 10, 311–326.
- 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 and Community Health*, 57, 29–35.
- Pate, R.R., Pratt, M., Blair, S.N., Haskell, W.L., Macera, C.A., Bouchard, D., et al. (1995). Physical activity and public health: A recommendation from the CDC and the ACSM. *JAMA*, 273, 402–407.
- Paveza, G., Cohen, D., Hagopian, M., Prohaska, T., Blazer, C.J., & Brauner, D. (1990). A brief assessment tool for determining eligibility and need for community-based long term care services. *Behavior, Health and Aging*, 1, 121–132.
- Plonczynski, D.J. (2003). Physical activity determinants of older women: What influences activity? *MED-SURG Nursing: The Journal of Adult Health*, 12, 212–221.
- Reiff, G.G., Montoya, H.J., Remington, R.D., Napier, J.A., Metzner, H.L., & Epstein, F.H. (1967). Assessment of physical activity by questionnaire and interview. *Journal of Sports Medicine and Physical Fitness*, 7, 135–142.
- Resnick, B., & Jenkins, L.S. (2000). Testing the reliability and validity of the Self-Efficacy for Exercise Scale. *Nursing Research*, 49, 154–159.
- Sanderson, B., Littleton, M., & Pulley, L. (2002). Environmental, policy, and cultural factors related to physical activity among rural, African American women. *Women & Health*, 36(2), 75–90.
- Scharff, D.P., Homan, S., Kreuter, M., & Brennan, L. (1999). Factors associated with physical activity in women across the life span: Implications for program development. *Women & Health*, 29, 115–134.
- Seca Company. (1997). *Seca weighing and measuring systems: 840 user's manual*. Hamburg, Germany: Seca Company.
- Semanik, P., Wilbur, J., Sinacore, J., & Chang, R.W. (2004). Physical activity behavior in older women with rheumatoid arthritis. *Arthritis and Rheumatism*, 51, 246–252.
- Sherbourne, C.D., Sturm, R., & Wells, K.B. (1997). What outcomes matter to patients? *Journal of General Internal Medicine*, 14, 357–363.
- Speck, B.J., & Looney, S.W. (2006). Self-reported physical activity validated by pedometer: A pilot study. *Public Health Nursing*, 23, 88–94.
- Swenson, C., Marshall, J., Mitulich-Gilbertson, S., Baxter, J., & Morgenstern, N. (2005). Physical activity in older, rural Hispanic, and non-Hispanic white adults. *Medicine & Science in Sports & Exercise*, 37, 995–1002.
- Taylor, H.L., Jacobs, D.R., Schucker, B., Knudsen, J., Leon, A.S., & DeBacker, G. (1978). A questionnaire for the assessment of leisure time physical activities. *Journal of Chronic Diseases*, 31, 741–755.
- U.S. Census Bureau. (2002). *Census 2000 urban and rural classification*. Retrieved January 21, 2008, from http://www.census.gov/geo/www/ua/ua_2k.html.
- U.S. Census Bureau. (2007). *Annual estimates of the population for incorporated places in Illinois, listed alphabetically: April 1, 2000 to July 1, 2006*. Retrieved January 21, 2008, from <http://www.census.gov/popest/cities/SUB-EST2006-4.html>.
- U.S. Department of Agriculture. (2005). *Rural population and migration: Rural older population*. Retrieved January 21, 2008, from <http://www.ers.usda.gov/briefing/population/older/>.
- U.S. Department of Health and Human Services. (1996). *Physical activity and health: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services.
- U.S. Department of Labor. (1972). *Title IX Education Amendments of 1972, 1681–1688*. Retrieved January 22, 2008, from <http://www.dol.gov/oasam/regstatutes/titleix.htm>.
- Walker, S.N., Pullen, C.H., Hertzog, M., Boeckner, L., & Hageman, P.A. (2006). Determinants of older rural women's activity and eating. *Western Journal of Nursing Research*, 28, 449–468.
- Ware, J., Jr., Kosinski, M., & Keller, S.D. (1996). A 12-item short-form health survey: Construction of scales and preliminary tests of reliability and validity. *Medical Care*, 34, 220–233.
- Ware, J., Jr., Kosinski, M., & Keller, S.D. (1998). *SF-12(R): How to score the SF-12(R) Physical and Mental Health Summary Scale (3rd ed.)*. Boston: QualityMetric, Inc.
- Weisberg, S. (1985). *Applied linear regression (2nd ed.)*. St. Paul, MN: John Wiley.
- Wilbur, J., Chandler, P., Dancy, B., Choi, J., & Plonczynski, D.J. (2002). Environmental, policy, and cultural factors related to physical activity in urban African American women. *Women & Health*, 36, 17–28.
- Wilbur, J., Holm, K., & Dan, A.J. (1993). A quantitative survey to measure energy expenditure in midlife women. *Journal of Nursing Measurement*, 1, 29–40.
- Wilbur, J., Miller, A.M., Chandler, P., & McDevitt, J. (2003). Determinants of physical activity and adherence to a 24-week home-based walking program. *Research in Nursing & Health*, 26, 213–224.
- Wilbur, J., Miller, A.M., Dan, A.J., & Holm, K. (1989). Measuring physical activity in midlife women. *Public Health Nursing*, 6(3), 120–128.
- Wilcox, S., Bopp, M., Oberrecht, L., Kammermann, S.K., & McElmurray, C.T. (2003). Psychosocial and perceived environmental correlates of physical

- activity in rural and older African American and white women. *Journals of Gerontology*, 58, P329–P337.
- Wilcox, S., Castro, C., King, A.C., Housemann, R., & Brownson, R.C. (2000). Determinants of leisure time physical activity in rural compared with urban older and ethnically diverse women in the U.S. *Journal of Epidemiology and Community Health*, 54, 667–672.
- Wilcox, S., Richter, D.L., Henderson, K.A., Greaney, M.L., & Ainsworth, B.E. (2002). Perceptions of physical activity and personal barriers and enablers in African-American women. *Ethnicity & Disease*, 12, 353–362.