Issues in the Assessment of Physical Activity in Women

Barbara E. Ainsworth

Keywords: physical activity, exercise, recreation, leisure, women, surveys

Women spend forty-plus hours a week at a full-time job and anywhere from twenty-five to forty-five hours a week working in the home. All this household work often seems unavoidable, like death and taxes." (Schor, 1992, page 83)

OVERVIEW

Regular physical activity is promoted as a lifestyle behavior associated with reductions in mortality and morbidity from cardiovascular diseases, colon cancer, complications of overweight and obesity, and improvements in emotional well being (U.S. Department of Health and Human Services, 1996). Despite these well-documented benefits, women tend to report low participation in regular activity with little or no engagement in vigorous activity, and frequently report barriers related to lack of time, energy, and family concerns as reasons for their low activity patterns (Jaffe, Lutter, Rex, Hawkes, & Bucaccio, 1999). National surveillance data shows a high prevalence of irregular and sedentary physical activity behaviors among women, exceeding levels observed in men by 15-20%. (U.S. Department of Health and Human Services, 1996). Further, studies relating regular physical activity as a protective exposure for all-cause mortality, and cardiovascular disease mortality and morbidity show inconsistent associations (Kushi et al., 1997; Sesso, Paffenbarger, Ha, & Lee, 1999); leading some to speculate that perhaps women need less activity than men to obtain optimal health benefits (Blair, Kohl, & Barlow, 1993). The theme of this paper is that women as a group are very active in their lives and that surveys used in existing studies may fail to measure the frequency, duration, and intensity of physical activities actually performed by women.

U.S. SURVEILLANCE DATA: ARE WOMEN REALLY INACTIVE?

Three survey systems are supported in the U.S. to identify the prevalence of leisure time physical activity and sedentary behaviors in adults - the Behavioral Risk Factor Surveillance System (BRFSS), National Health Interview Survey (NHIS), and the National Health and Nutrition Examination Survey (NHANES). Regardless of which system is used, data show that only about 25% of the U.S. population perform regular, sustained physical activity and nearly 30% of the population is entirely inactive. Women tend to report less regular activity, with lower levels associated with increasing age and in ethnic minorities (U.S. Department of Health and Human Services, 1996). Based on an analysis of the 1990 NHIS, Jones et al. (1998) reported only 29.8% (95% CI = 28.6 - 30.9) of adult women met the 1995 CDC and American College of Sports Medicine (ACSM) recommendation for regular, moderate intensity physical activity (Pate et al., 1995). Prevalence estimates were lower among women of color, the overweight, and the least educated, and were inversely related with age. Similar observations were reported for proportion of women meeting the 1996 Surgeon General’s recommendation for regular, moderate amounts of physical activity (U.S. Department of Health and Human Services, 1996). Data from the NHANES III are also similar, showing the age-adjusted prevalence of no leisure time physical activity to be highest among all women.

Barbara E. Ainsworth, Ph.D., MPH, FACSM is with the Department of Epidemiology and Biostatistics and the Department of Exercise Science in the School of Public Health at the University of South Carolina.

ROES: June 2000
women (27%), especially among women of color (Non-Hispanic Black, 40% and Mexican American, 46%) as compared with White men (Crespo, Keteyian, Heath, & Sempos, 1996).

The surveillance systems have in common the measurement of exercise, sports, and physically active hobbies, which few women do on a regular basis. They fail to measure occupational, household, transportation, and family activities where women spend most of their time. Thus, results of surveillance system surveys should be interpreted in light of the questions asked and activities surveyed.

WOMEN'S LIVES: ACTIVE AND BUSY

Estimates from physical activity time-and-motion studies suggest that women spend significant portions of their day in occupational, household, and family-care activities and less time in recreational and conditioning activities (Ainsworth, Irwin, Addy, Whitt, & Stolarczyk, 1999; Shaw, 1985; Shaw 1991). In her book, The Overworked American, Schor (1992) analyzed data from the 1980-81 Michigan Time Use Studies and the 1980 and 1988 Current Population Surveys to estimate that women spent an average of 3.9 hours/day in household and family care activities. Activities surveyed included indoor and household chores, caring for children, obtaining goods and services, and other miscellaneous activities. Interestingly, she noted that the amount of time spent in household and family care activities in the past 30 years has declined only 15% (from 4.6 hours/day to 3.9 hours/day) while the time spent in paid work has increased 27%. This results in a net decrease in the time available for recreation and other leisure pursuits.

Women spend large portions of their day in activities related to the care of the family and home. In an effort to identify how Canadian women with families spend their time, Shaw (1985) used 48-hour timed diaries and asked women to record all activities performed for several days. She showed that household tasks, including care for the home, children, and other family activities, comprised nearly one-third of all diary entries (714/2,156 entries). In a 1992 follow-up study among 92 Canadian parents and children, Shaw (1992) reported that women spent 2 1/2 hours per day tending to the family, with about 35% in household labor, 27% in shared meals, and 38% in unstructured time with children. When asked to rate the proportion of the time spent with children as work, leisure, or a combination of the two, women reported more time as work (40%) and less as leisure (25%) as compared with men (work, 24%; leisure, 56%).

The feelings that women have the burden of household and caring for the family is expressed repeatedly in the feminist leisure research (Henderson, Baleschki, Shaw, Freysinger, 1989, 1996). Women have traditionally been socialized to assume domestic roles and much of the meaning for women's lives is tied to the family and care of the home. Even among women employed in full-time occupations away from home, childcare and household chores are still the responsibility of women, however the amount of time spent in these activities may vary. In 1994, Ward enrolled 53 Caucasian women into a study designed to identify the time spent in household and childcare activities among women employed in full-time jobs. Subjects kept detailed physical activity records of their daily activity for two weeks. All subjects recorded doing household activities on a daily basis, spending from 31 minutes to 6 hours/day in a variety of these activities (mean + SD = 2.0 + 1.0 hour/day). The time spent in household activities was most among women with children, with childcare adding an additional 30 minutes/day.

Ethnicity, race, and culture are important determinants of how women view their roles in families and how they spend their day. In surveillance system surveys, women of color are among the least active and report the highest rates of sedentary behaviors. Their lack of participation in recreational sports and conditioning activities is inversely related with their involvement in the home. Ainsworth et al. (1999) completed a study of 141 African American and Native American women living in South Carolina or on Indian reservations in New Mexico, respectively. Based on 12 days of detailed physical activity records kept for 3 x 4-day periods, five frequent moderate-intensity activities were identified: household tasks, walking for exercise, occupation, childcare, and lawn and garden activities. Between 50-95% of all women reported doing these activities on most days for median duration of 24-43 minutes/day. Fewer than 25% reported conditioning and sports activities and, among women who did report these activities, the median duration was less than 5 minutes/day.

To provide better measures of women's usual activity patterns, surveys need to be broad and inclusive of activities performed by women in their daily lives. If only activities related to sports, recreational pursuits, and lawn and garden activities were reported in the physical activity records in the previous study by Ainsworth et al. (1999), fewer than 41% would have met the CDC/ACSM recommendation to obtain at least 30 minutes/day in moderate activity on most days of the week. However, using all activities recorded in the books, an estimated 87% of subjects met the CDC/ACSM recommendation. This suggests most women are getting enough moderate intensity activity and that physical activity questionnaires used to study physical activity among women should be reevaluated.
PROBLEMS WITH LEISURE-TIME SURVEYS IN WOMEN

In their books, A Leisure of One’s Own - A Feminist Perspective on Women’s Leisure, and Both Gains and Gaps - Feminist Perspectives on Women’s Leisure, Henderson et al. (1989, 1996) discuss the role of leisure in the context of women’s lives. They define leisure as “an experience” that occurs within the context of time and activity, with time referring to discretionary periods in one’s life that are available to do whatever one wishes - as in having free time or doing recreational pursuits during one’s free time (1996, pp. 19-20). For activities to be defined as leisure, they must be in settings that include the elements of free choice, freedom from constraints, involving intrinsic motivation, enjoyment, relaxation, personal involvement, and self-expression (1989, pp. 57-61). It is doubtful that many women view household and family responsibilities or doing other activities defined as work in unpaid settings as leisure experiences. In her research of women in family settings, Shaw (1992) notes that much of the time that families spend together and that parents spend with their children is not viewed as leisure, especially for mothers. Hence, asking women to complete a survey about their leisure-time physical activity may have been as irrelevant.

Caspersen, Powell, and Christenson (1985) defined physical activity as any bodily movement produced by skeletal muscles that result in caloric expenditure. Physical activity researchers have commonly dichotomized physical activity into two components: occupation and nonoccupation (Ainsworth & Macera, 1998). Bouchard and Shephard (1994) defined physical activity in a three-component model: leisure, occupation, and other chores. Many of the physical activity questionnaires presented in a monograph edited by Kriska and Caspersen (1997) relate to a two-component model of leisure time activities addressing primarily exercise, sports, conditioning, lawn and garden, home repair, and walking for exercise or occupation. Other surveys are more inclusive of multiple domains of activity to include household, occupation, and childcare activities. In 1995, Ainsworth, Richardson, Jacobs, and Leon evaluated a 4-week history modification of the Minnesota Leisure Time Physical Activity (LTPA) survey to identify the impact of excluding household activities from time and energy expenditure estimates of non-occupational activities among men and women enrolled in the Survey of Activity, Fitness, and Exercise study. As anticipated, men reported more time per day in light, moderate, and vigorous intensity leisure time activities than women and women reported more time per day in household activities than men. When excluding household activities, the daily energy expenditure averaged 250 MET-min/day in men and 183 MET-min/day in women. After including household activities, women expended more energy per day than did men (men = 385 MET-min/day; women = 421 MET-min/day). This study provides an example of how a failure to include gender-relevant activities in a questionnaire may result in a misclassification of one’s true activity status.

Young, Miller, Wilder, Yanek, and Becker (1998) demonstrated the importance of including walking to work and occupational walking when determining the activity status of older, urban adults. They assessed physical activity patterns in 251 urban African Americans participating in health fair screenings in East Baltimore, MD. When subjects were surveyed about their exercise and sporting activities, only 16% of women were defined as participating in regular, leisure time activities for 30 minutes/day, 5 days per week. However, when the definition of physical activity participation was broadened to include spending over half the day walking at work, walking at least 10 blocks to and from work, as well as regular leisure activity, 38% of women were active.

Misclassification of activity status may also affect the results of epidemiological studies designed to identify a protective effect of regular physical activity on risks for morbidity and mortality. In an analysis of the 1981 Canada Fitness Survey, Weller and Corey (1998) evaluated the impact of leisure and non-leisure energy expenditure on the relation between physical activity and mortality in women. Subjects were 6,620 women aged 30 years of age (mean ± SD, 50.3 ± 15.0 years) who were without known heart disease at the time of the survey. Cardiovascular and cerebrovascular disease mortality events were obtained from death certificates. Eighty-five percent of the daily energy expenditure was explained by non-leisure time activities (7.0 out of 8.2 kcal/kg/day). Odds ratios decreased with increasing amounts of total energy expended (leisure + non-leisure activities), reflecting a reduced odds of mortality with increased amounts of total energy expenditure. However, when analyses were performed for each type of activity separately, only the odds ratios for non-leisure activities displayed a decreasing trend with increasing activity. The investigators concluded that the survey items relating only to leisure activity likely failed to capture a large proportion of women’s daily energy expenditure.

WOMEN-CENTERED PHYSICAL ACTIVITY SURVEYS

In 1996, under the aegis of the Women’s Health Initiative, 55 experts met for a two-day meeting to identify important issues related to measuring physical activity in minority women, women in midlife (aged 40-75), and older women (aged > 75) (Masse et al., 1998). The task for the meeting was to identify key issues that may improve the accuracy of measuring physical activity among women. Five broad areas of concern emerged from the
discussions as related to the characteristics of the sample population, dimensions of physical activity, ability to measure moderate and intermittent activities, designing and administering surveys, and assessing the reliability and validity of surveys. Above all, participants felt physical activity surveys must 'speak to the lives of women' in the selection of activities surveyed. Activities important in the lives of women were identified as occupation, home chores and family caregiving, transportation, shopping, social, community or church involvement, personal (free) time, and physical recreation activities. However, the challenge in measuring physical activity among women is the recognition that women hold multiple roles in their family and that care of the household may vary with cultural and ethnic heritage. For example, in a qualitative study of physical activity among minority women, Exler et al. (1998) cited comments about physical activity made by Chinese and Filipino women:

Most Americans, [get] their [physical] activities with exercise and jogging. Most Filipinos, are doing housework. That's a physical activity. (p. 644)

I think aerobics, let's say aerobics tape is a waste of time. You stand there doing that, you're not accomplishing anything. If you were dusting, and carpet sweeping the floor, or vacuuming, you're doing something. (p. 644)

In recent years, there have been several studies designed to measure the contribution of occupation and home and family care activities to physical activity surveys of leisure and sports/conditioning pursuits. In 1998, Randsell and Wells modified the College Alumni Questionnaire to include household, childcare activities, and time spent sleeping to estimate 24-hour energy expenditure among 521 African-American, Mexican-American, and white women residing in Phoenix, AZ. Home and family care activities accounted for approximately 20% to 33% of the daily energy expenditure, while leisure time physical activities accounted for less than 1% of the daily energy expenditure.

In another setting, the Baecke physical activity survey (Baecke, Burema, & Frijters, 1982) was modified to include questions about caregiving and housework. The survey, referred to as the Kaiser Physical Activity Survey (KPAS), was validated in 50 adult women, ages 18-60 (Ainsworth, Sternfeld, Jackson, & Richardson. In Press). Spearman rank-order correlation coefficients between the survey responses and a detailed physical activity record were moderate in size and statistically significant for activity indexes of housework/caregiving, (r=.67), sports/exercise (r=.73), occupation (r=.35), and active living habits (r=.30). Sternfeld, Ainsworth, and Quesenbury (1999) administered the KPAS to 5,000, ethnically diverse women enrolled in the Northern California Kaiser Permanente Medical Care Program. High levels of household and caregiving activities were directly associated with older age, Hispanic ethnicity, being married, having young children at home, and time constraints as barriers to exercise. Conversely, women with the highest level of participation in sports/exercise and active-living behaviors were more likely to be younger, white, college-educated, without young children at home, and leaner.

There is an increasing number of examples of studies that have modified published leisure-time and occupational activity surveys to include gender-relevant activities and to delete gender-irrelevant activities. Wilbur, Naftziger-Kang, Miller, Chandler, and Montgomery (1999) used a modification of the Minnesota LTPA and Tecomseh Self-Administered Occupational Questionnaire to measure occupation, household and leisure-time activities. They showed that women employed in more active occupations had lower total cholesterol and higher HDL cholesterol levels than women employed in sedentary occupations, despite similar leisure-time and household activity levels between groups.

In 1995, Ainsworth and colleagues (1999) studied the daily physical activity patterns of minority women, age 40 years and older, with a goal to develop culturally sensitive questionnaires that measure moderate-intensity physical activity. To understand the type, duration, and frequency of physical activities performed, the investigators enrolled 141 women in a study to keep detailed physical activity records of their daily physical activities for 12 days during a six-month period. Participants recorded all their activity performed each day to include the time they started each activity, a description and classification of their perceived intensity and body position maintained during the activity, and the purpose of the activity.

The physical activity records were scored using the Compendium of Physical Activities (Ainsworth, Haskell, et al., 1993) to assign a 5-digit code to each recorded activity. The 5-digit code identifies a major heading for the activity, such as occupation or home repair, and which specific activity is performed. Using a computer scoring program, the 5-digit codes are mapped to a MET intensity and minutes each activity was performed so that summary scores in minutes per day and MET-minutes per day are computed for individual activities and/or groups of activities.

Participants recorded an average of 50-100 activities per day with over 100,000 total activities recorded by all study participants in the record books. Among the 280 types of activities listed, 89.9% were light intensity (<3 METS), 9.9% were moderate intensity (3-6 METs), and 0.2% were classified as vigorous intensity (>6 METS). The most frequent activities recorded were walking to and from the car, bus, or to work (13.7%), walking in the house (8.5%), driving a car (7.4%), and walking in the hall at work (4.0%), all rated as 2.5 METs or lower in in-
tensity. Most of the moderate activities were related to cleaning the house, standing and walking at work, caring for children and older adults, and walking for exercise. Few study participants performed recreational activities with only 27 entries relating to sports, 4 to bicycling, 9 to dancing, 3 to water activities, and 329 relating to conditioning activities, of which 181 entries were stretching. It was also noticed that participants were less active on Saturdays and Sundays as compared with weekdays.

Based on the information obtained from the physical activity records, the investigators developed a one-week physical activity recall questionnaire that reflected activities frequently recorded in the record books. These included household chores, lawn, yard, garden, and farm activities, taking care of others, walking for non-work reasons, transportation, conditioning, dance and sport, leisure activities, occupation, and volunteer activities. At first glance, some activities, such as occupation, housework, or taking care of others, may intuitively seem unrelated to mechanisms associated with increased fitness or reduced risks for chronic diseases. However, if the purpose of administering a physical activity questionnaire is to reflect the activity patterns of a population, or subgroup of the population, then it is important to identify the quantity and quality of the behaviors performed. By measuring these activities it is possible to answer questions related to the relative importance of household, family care, and occupational chores in the health status and quality of life among women.

A comprehensive evaluation of the one-week recall survey is underway. Preliminary analyses show promise that the survey is able to capture moderate intensity activities that are routinely performed by women, activities that promote strength and flexibility, and sedentary leisure activities that may be modifiable in individual and community interventions.

CONCLUSIONS

In 1985, Stevens, Jacobs, and White (1985) reviewed physical activity surveys used to measure the prevalence of physical activity in various countries. They noted marked differences in the proportion of populations defined as physically active during leisure time by the rigor of the definition for moderate and vigorous physical activity. Studies with the most rigorous definition of physical activity showed a larger prevalence of inactivity as compared with studies that used less rigorous definitions. This observation has particular relevance for women. When physical activities measured on surveys are broadened from sports and conditioning activities to include occupation, transportation, and housework/family care activities, prevalence of regular physical activity among women increases and associations between physical activity and health outcomes may become more important (Weller & Corey, 1997). While considerable progress has been made to identify physical activity patterns of women, the challenge herein remains to develop surveys that are meaningful for women, culturally relevant, short in length, and easily understood by respondents in various settings.

REFERENCES


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.