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Original research

Examining differences in physical activity levels by employment status and/or job activity level: Gender-specific comparisons between the United States and Sweden

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ABSTRACT

Objectives: The aim of the study was to examine the relationship between employment status and job activity level with physical activity (PA) and sedentary time, stratified by gender and country.
Design: Cross-sectional study design.
Methods: Data from working age adults (18–65 years) from two cross-sectional studies, the Swedish 2001–2002 and 2007–2008 Attitude Behavior and Change Study (ABC; $n = 1165$) and the 2003–2006 US National Health and Nutrition Examination Survey (NHANES; $n = 4201$), were stratified by employment status (employed and not employed) and job activity level (active, sedentary and mixed). PA in counts $\times$ min^{-1} and time spent in sedentary, low and moderate or higher intensity were measured with accelerometers. Analyses were conducted in 2012–2013.
Results: In NHANES, the employed had significantly higher counts $\times$ min^{-1} and spent more time in moderate or higher intensity PA than those not employed. In ABC, no significant differences were observed between employed and unemployed. Adults with active versus sedentary occupations had higher counts $\times$ min^{-1} and less sedentary time in both the USA and Sweden and in both men and women. For example, counts $\times$ min^{-1} were 20–40% greater in active versus sedentary jobs.
Conclusions: Employment status is related to PA and sedentary time among men and women in the USA but not in Sweden. Among the employed, occupational PA is associated with total PA and sedentary time for both genders and in both countries. Comparisons of PA levels based on objective measurements can refine understanding of country differences in activity.

1. Introduction

Despite the well-known health benefits of regular physical activity (PA), a large proportion of the population is not sufficiently active to obtain these benefits.[1] To increase PA and promote health, it is crucial to understand the factors that affect PA. One such factor is employment.[2] During a full-time working day, adults spend ~31% of their day on the job.[3] The contribution of PA or inactivity at work to total PA and inactivity is therefore substantial.[4] Specifics of how and under what circumstances occupational PA (OPA) influences total PA are unclear. Although some studies suggest that OPA leads to compensatory behavior during leisure-time (i.e. higher levels of OPA lead to lower levels of leisure-time activity),[5,6] other studies have observed no such association.[4,7]

One explanation for these contradictory findings is that few studies have used objective measures to assess PA; in most studies, PA was self-reported, potentially resulting in increased measurement error.[5–7] Another explanation could be that few studies have explored gender-specific patterns in the association between OPA and total PA. Csizmadi et al. showed that among men, self-reported PA level was mostly determined by OPA, while in women OPA and household activity were important determinants.[8] Moreover, Van Domelen et al. showed that full-time employed men were more active than unemployed men, whereas unemployed,

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full-time or part-time employed women were all equally active.[9] Gender-specific patterns might be culturally dependent. For example, a study comparing levels and patterns of objectively assessed PA among adults in Sweden and the US found no differences in PA intensities between Swedish males and females, but US males were more active than US females.[10]

This study expands on the work done by Hagströmer[10] and Van Domelen.[9] The aims are to: (1) Examine the relationship between employment status (employed, unemployed) and objectively-measured PA and sedentary time separately for men and women, (2) Examine the relationship between job activity level (active, sedentary, or mixed) and objectively-measured PA and sedentary time separately for men and women, (3) Explore whether the above-mentioned relationships vary between Sweden and the USA.

2. Methods

Data originate from two cross-sectional studies: from Sweden, the Attitude Behavior and Change Study (ABC) and from the USA, the National Health and Nutrition Examination Survey (NHANES). ABC is a study on health behaviors with data collected from different samples at two time-points (2001–2002[11] and 2007–2008) by questionnaire and PA monitoring. A random sample (18–69 years) was invited from the Swedish register; of those who were eligible to participate 68% (2001–2002) and 53.5% (2007–2008) participated in the study. The final sample was evenly distributed across Sweden, with an age and gender profile similar to that of the Swedish general population. NHANES is a continuous study using a complex multistage sampling protocol.[12] The study collects health information on a nationally representative sample by interviews, physical examinations and testing. The response rate for NHANES was 76% (2003–2004) and 80% (2005–2006).[13] The protocols of ABC and NHANES are available.[11,12] Both studies were approved by local ethical boards.[11,14] Informed consent was obtained before participating in the study.

This study used data from ABC 2001–2002 and 2007–2008, and NHANES 2003–2006. The study population consisted of participants of working age (18–65 years) with accelerometer data of ≥4 days with ≥10 h/day of valid wear time (ABC $n = 1165$; NHANES $n = 4201$). A minimum of four recording days is recommended to reflect 1 week's worth of PA.[15] In ABC participants with valid wear times did not differ from those who did meet wear time criteria. In NHANES, the highest wearing compliance was among adults >60 years, with more than 84% having ≥4 days. The least compliant were females ages 20–39 years, with approximately 60–62% having ≥4 days.[16] Analyses were conducted in 2012–2013.

Demographic data included age (years), body mass index (BMI) (kg/m^2; self-reported in Sweden and measured in the USA), marital status (married/living together with partner; single/not living with partner), educational level (low, middle and high), smoking status (never smoked, former smoker and current smoker), self-perceived health status (excellent/very good, good/somewhat good and poor) and employment status (employed; unemployed). In the Swedish data, educational levels were classified as compulsory school (low), upper secondary (middle) and university degree or more (high). In the US data, educational levels were classified as less than high school (low), high school or some college (middle) and university degree or more (high). Age and BMI were continuous variables, the rest of the variables were categorical.

PA was assessed with uni-axial Actigraph, Model 7164, accelerometer set at 1 min epochs. The accelerometer measures vertical axis acceleration in units of "counts," providing an indication of the intensity of PA associated with locomotion. Participants wore the accelerometer using a belt for 7 days on the lower back (Sweden) or over the right hip (USA) and removed the device when swimming, bathing and sleeping. The accelerometers were returned by mail, after which data were downloaded and the accelerometers were checked for calibration status.

ABC accelerometer data were analyzed with Actigraph software (Actilife 6) and SAS. NHANES data were analyzed with custom software and SAS. Intensity of activities was estimated based on the Troiano et al. cut-points for both data sets.[16] Only data for valid wear time were included in the analyses. Valid wear time was defined by subtracting non-wear time from 24 h. Non-wear time was defined as an interval of at least 60 consecutive minutes of 0 activity intensity counts, allowing for 1–2 min with 1–100 counts, in accordance with previous studies.[9,10] For example, 90 min of 0's with a single accelerometer count of 48 at minute 37 would be defined as non-wear time.[16]

PA variables are presented as (1) mean counts × min^{-1} as a measure of the average intensity of PA, and (2) estimates of the total accumulated time in sedentary (0–99 counts; <1.5 MET); low intensity (100–2019 counts; 1.5–3.0 MET) and moderate or higher (≥2020 counts; ≥MPA; >3.0 MET) intensity PA according to previous validation studies.[16,17] Mean counts × min^{-1} were calculated by dividing the sum of total counts for a valid day by the number of minutes of wear time in that day across all valid days. In this study, we examined average intensity PA (counts × min^{-1}), sedentary time (min × day^{-1}) and ≥MPA (min × day^{-1}).

Occupation was assessed by questionnaire. All occupations were recoded into 40 occupation categories using the US Census Bureau's 2000 Indexes of Industry and Occupations.[18] Based on a classification scheme occupations were grouped into active jobs (high levels of OPA), sedentary jobs (low levels of OPA) and mixed jobs (uncertain levels of OPA).[19] Active jobs included waiters/waitresses; cleaning and building service occupations; farm and nursery workers; construction trades; construction laborers; laborers, except construction and freight, stock, and material movers, hand. Sedentary jobs included executives, administrators, and managers; management-related occupations; engineers, architects, and scientists; teachers; secretaries, stenographers, and typists; information clerks; records-processing occupations; material recording, scheduling, and distributing clerks; miscellaneous administrative support occupations and motor vehicle operators. Mixed jobs included jobs with activity level that was too ambiguous to classify,[19] and will not be presented ($n = 580$ ABC; $n = 770$ NHANES). Swedish job titles were matched to the US-based job classifications.

NHANES-data were analyzed using SAS software and SUDAAN to incorporate sample weights and account for the complex survey design. ABC data consisted of a simple random sample, so weighting and other adjustments were not deemed necessary and the data were analyzed using SPSS software. Independent-tests for continuous variables and chi-square tests for categorical variables were used to examine demographic variables by gender. Descriptive data on self-rated health status also were presented by employment status groups, due to the well-established relationship between health and employment status.[20] Per country, separate linear regression models for males and females were used to examine the association between employment status, job activity level, sedentary time and PA variables. All models were adjusted for accelerometer wear-time, age, BMI, marital status, educational level, self-rated health status and smoking status. Results are presented as means with 95% confidence intervals (CI) and comparisons of means were made using t-tests, unadjusted for multiple comparisons.

3. Results

There were significant differences between the genders in both Sweden and USA with regard to marital status, educational level,