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Leisure-time physical activity levels of the US workforce

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Abstract

Background. Few studies in the US have assessed physical activity levels across worker groups, despite the increasingly sedentary milieu of contemporary US occupations and increasing obesity rates among US workers. The present study determined the proportion of US workers meeting the Healthy People 2010 Guidelines for leisure-time physical activity levels in major US occupational groups.

Methods. Self-reported leisure-time physical activity was defined as: a) light–moderate activity ≥30 min five or more times per week; and/or b) vigorous activity ≥20 min three or more times per week. Findings collected on over 150,000 US workers, who participated in the 1997–2004 National Health Interview Surveys, were stratified by occupational group.

Results. On average, the proportions of US workers meeting recommended leisure-time physical activity levels were 31% in female and 36% in male US workers. There was substantial variation in the gender-specific rates of leisure-time physical activity levels by occupation (range: 16–55%) with the lowest rates noted in blue collar groups.

Conclusions. Leisure-time physical activity levels were sub-optimal among all major US worker groups, with substantial variability across occupations. As part of disease prevention, health professionals should promote increased physical activity levels among those occupations identified with very low rates of leisure-time physical activity.

Keywords: Physical activity; Occupation; Leisure-time; Surveillance

Introduction

Physical inactivity and improper nutrition are the primary determinants of the national obesity epidemic (Biolo et al., 2005). Physical inactivity poses almost as much risk for heart disease as cigarette smoking, high blood pressure, or high cholesterol levels, but is more prevalent than any of these other risk factors (Dubbert et al., 2002; Carmichael and Bates, 2004; Biolo et al., 2005). Physical inactivity is also a burden on the US economy. For example, one study has estimated that physical inactivity accounts for over 9% of annual US health care expenditures (Garrett et al., 2004).

Some studies have examined sedentary lifestyles and associated factors at the population level, however few have approached the subject from the occupational standpoint (Bernstein et al., 1999; Varo et al., 2003). American occupations have become increasingly sedentary and long hours of sitting or standing at work have been significantly associated with risk of obesity (Hu, 2003a,b; Hu et al., 2003). Furthermore, technological change has lowered the cost of calorie intake by making food cheaper, and has raised the cost of expending calories by transforming physical exercise from an occupational activity to an off-the-job leisure-time activity.

The Healthy People 2010 objectives have identified 15 goals directly related to improving the physical activity behaviors of the US population (USDHHS, 2000). The specific adult objectives selected to measure progress on the physical activity indicator included engagement in regular, preferably daily,

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moderate physical activity for at least 30 min per day. Given the rapidly increasing obesity epidemic already demonstrated in the US workforce (Caban et al., 2005), surveillance of leisure-time physical activity levels in US workers is essential so that healthcare providers can pursue targeted obesity intervention and prevention activities with their working patients. In the present study, over 153,000 US workers who participated in the 1997 to 2004 National Health Interview Survey were evaluated for meeting the Healthy People 2010 Guidelines of leisure-time physical activity by occupation and gender subpopulations.

Methods

The National Health Interview Survey (NHIS) is a continuous multipurpose and multistage probability area survey of the US civilian non-institutionalized population living at addressed dwellings (Caban et al., 2005). Information on employment (paid and unpaid) during the week prior to the NHIS interview was collected on subjects aged ≥18 years, permitting classification of workers into 41 standardized occupational categories (Caban et al., 2005). Only workers with a valid occupational code were retained for the present analysis.

Leisure-time physical activity questions included assessment for the frequency and duration of light or moderate activity (defined as "activity lasting at least 10 min that caused light sweating or a slight to moderate increase in breathing or heart rate"), and the frequency and duration of vigorous activity (defined as "activity lasting at least 10 min that caused heavy sweating or large increases in breathing or heart rate"). Participants were considered to have met the HP 2010 regular leisure-time physical activity guideline if they reported engaging in: either "light-moderate activity" classified as ≥30 min ≥5 times per week (n=11,205), "vigorous activity" ≥20 min ≥3 times per week (n=28,756), or qualified for both activity categories (n=10,766) (Fig. 1). Individuals (n=101,146) who stated they were unable to engage in leisure-time activity were combined with persons who said they never engaged in any leisure-time activity, consistent with the methods and definitions used by the National Center for Health Statistics (NCHS) (Schoenborn et al., 2004). Approximately 1% of workers did not answer any of the leisure-time physical activity questions or failed to provide enough information to be classified as engaging in either light/moderate or vigorous leisure-time physical activity (e.g. provided information on frequency but not duration).

Statistical methods

Because of the complex sample survey design, analyses were completed using the Software for the Statistical Analysis of Correlated Data (SUDAAN) package to take into account sample weights and design effects; pooled annual prevalence estimates, were calculated as described previously (Caban et al., 2005). To assess leisure-time physical activity level trends, a weighted linear regression model was fitted to the annual design-adjusted rates within the subgroups of interest with statistical significance set at $p<0.05$. The weight used for each annual rate was the inverse of its variance.

Results

In the 1997–2004 NHIS, participants were aged from 18 to 88 years old with a mean age of 40.3±12.7 (±Standard Deviation). Just over 31% of the male and 36% of the female US workers met the recommended Health People 2010 leisure-time physical activity guidelines. There were no significant upward or downward trends in the prevalence rate of leisure time physical activity from 1997 to 2004 among US workers stratified by gender, race and ethnicity (Fig. 2). Male workers had consistently higher levels of leisure-time physical activity levels compared to female workers over the 1997–2004 time period (32–38% vs. 29–34%, respectively). White workers had consistently greater leisure-time physical activity levels compared to black and 'other race' workers (33–36% vs. 26–34%, respectively), while Hispanic workers were much less likely to report recommended leisure-time physical activity levels compared to non Hispanic workers (24–27% vs. 33–37%, respectively).

Over the 8 year period from 1997 to 2004, there were significant declines in leisure-time physical activity levels among male workers employed in Management related occupations (rate of change=−0.83; standard error=0.21); Fabricators, assemblers, inspectors, and samplers (−1.08; 0.28); and Motor Vehicle operators (−0.94; 0.34). There were significant increases in the prevalence of leisure time physical activity among females employed in Management related occupations (+0.76; 0.27); Sales representatives, commodities and finance (+1.08; 0.41); and secretaries, stenographers, and typists (+1.82; 0.59).

The percentage of worker groups by gender meeting the Healthy People 2010 definition of leisure-time physical activity

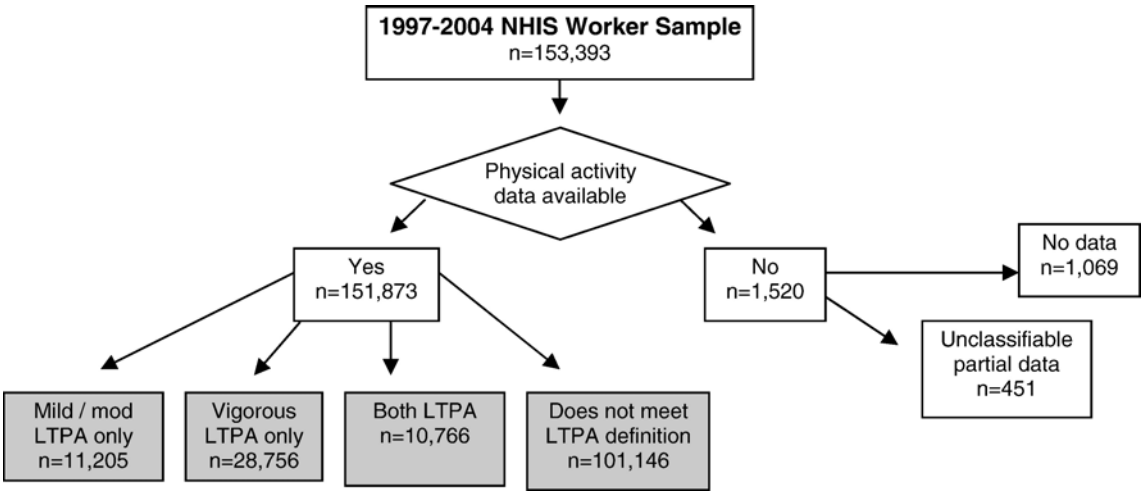

Fig. 1. Flowchart for classification of workers into Healthy People 2010 leisure-time physical activity (LTPA) categories, The National Health Interview Survey, 1997 to 2004.

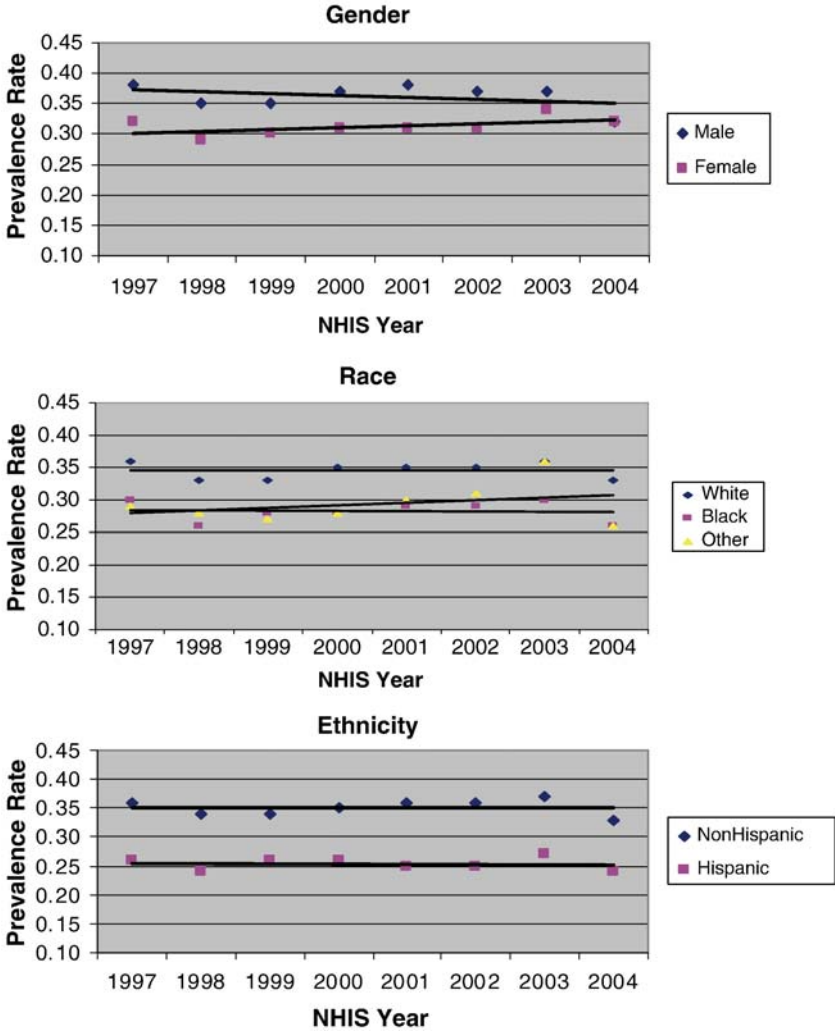

Fig. 2. Trends in US worker leisure-time activity by gender, race, and ethnicity, The National Health Interview Survey, 1997 to 2004.

are reported in Table 1. Overall, by occupational category, the estimated pooled annual proportion of female workers meeting the definition of recommended leisure-time physical activity ranged from 46% to 16%, while male worker rates ranged from 55% to 25%. The five female occupational groups with the lowest proportion of workers meeting the Healthy People 2010 annual leisure-time physical activity guidelines were: Machine operators/tenderers except precision (meeting recommended leisure-time physical activity prevalence = 16%); Fabricators, assemblers, inspectors, samplers (18%); Material moving equipment operators (18%); Cleaning and building service (20%); and Freight, stock, material handlers (20%). The five male occupational groups with the lowest proportion of workers meeting the Guidelines were: Farm operators and managers (25%); Farm workers and other agricultural workers (25%); Construction laborers (26%); Cleaning and building service (27%); and Forestry and fishing occupations (27%).

Discussion

Analysis of data from the National Health and Nutrition Examination Survey (NHANES) III indicated that workers who were employed in physically demanding occupations were less likely to be obese relative to workers engaged occupations which required little physical exertion (King et al., 2001). Unfortunately, the proportion of the US workforce employed in low physical activity occupations has increased from 23% in 1950 to 41% in 2000; during this same time period, the proportion of the US workforce engaged in high activity occupations has declined from 30% to 23% (Brownson et al., 2005). Furthermore, the trend toward increased mechanization of many job tasks suggests that occupation-specific energy expenditures for many blue-collar, as well as some white-collar, jobs have also been declining over this time period as well. Other non-occupational secular trends which have led to declining rates of physical activity levels in the US population include: increased use of automobiles for travel, increases in leisure-time sedentary activities (such as television watching), and increases in the use of labor-saving devices in the home (Brownson et al., 2005). These occupational and non-occupational trends suggest that leisure-time physical activity levels will take on increasing importance in maintaining and enhancing the health of the Nation.

Table 1
Percent of US workers by gender meeting the Healthy People 2010 recommended leisure-time physical activity levels of US worker groups from the 1997–2004 National Health Interview Survey[a]

Occupation	Males			Females		
	Estimated US worker population	NHIS sample size	% Exercise[b]	Estimated US worker population	NHIS sample size	% Exercise[b]
Total	67,295,584	75,022	36	58,028,885	76,851	31
Officials and administrators public admin	403,134	434	43	369,713	525	31
Managers administrators, except public administration	7,272,533	7791	41	5,048,892	6627	36
Management related occupations	2,145,080	2334	42	2,940,700	3864	35
Engineers	1,770,314	1861	44	202,275	263	45
Architects and surveyors	185,286	209	47	39,178	49	43
Natural mathematical/computer scientists	1,828,875	2015	46	787,830	1071	42
Health diagnosing occupations	757,642	772	51	293,948	377	46
Health assessment/treating occupations	431,252	486	45	2,869,192	3513	38
Teachers, librarians, counselors	2,143,317	2389	52	4,665,859	5906	41
Writers, artists, entertainers, athletes	1,169,655	1410	47	1,110,940	1478	44
Other professional specialty occupations	1,481,366	1641	48	1,438,179	1996	38
Health technologists/technicians	368,284	394	42	1,468,113	1876	32
Technologists, technicians except health	1,786,063	1995	39	833,058	1121	36
Supervisors and proprietors	2,273,853	2419	36	1,521,792	1923	27
Sales representatives, commodities and finance	2,618,251	2771	43	1,562,285	2038	39
Other sales	2,326,746	2458	37	3,769,708	4789	26
Computer equipment operators	168,339	182	35	203,739	283	28
Secretaries, stenographers and typists	58,321	74	34	2,572,932	3276	29
Financial records processing occupations	212,772	249	36	1,866,976	2393	28
Mail and message distributing	503,481	577	34	368,265	497	27
Other administrative support	2,952,905	3364	37	8,254,599	10,839	28
Private household occupations	33,520	41	41	643,231	1006	27
Police and firefighters	1,199,680	1296	55	216,625	320	42
Other protective service occupations	692,925	839	37	263,074	374	28
Food service	2,169,299	2489	34	3,131,848	4124	26
Health service	283,035	349	40	2,330,125	3345	25
Cleaning and building service	1,633,057	1998	27	1,400,367	2127	20
Personal service	479,408	581	41	2,241,124	3051	32
Farm operators and managers	700,736	762	25	139,259	162	33
Farm workers and other agricultural workers	1,575,327	2085	25	360,481	500	26
Forestry and fishing occupations	134,988	147	27	4708	8	[c]
Mechanics and repairers	4,398,967	4790	32	200,529	282	31
Construction and extractive trades	5,563,509	6288	31	147,746	188	35
Precision production occupations	2,548,881	2815	31	802,467	1086	21
Machine operators/tenderers, except precision	2,842,681	3277	27	1,471,483	2146	16
Fabricators, assemblers, inspectors, samplers	1,622,158	1795	29	987,253	1363	18
Motor vehicle operators	3,426,034	3935	28	495,220	675	27
Other transportation, except motor vehicles	181,507	178	39	3421	7	[a]
Material moving equipment operators	1,078,483	1175	28	74,679	104	18
Construction laborers	1,006,417	1243	26	24,992	38	29
Freight, stock, material handlers	2,867,505	3114	30	902,081	1241	20

[a] Confidence intervals, standard errors for each prevalence estimate are provided at the Miami NIOSH Research Website: http://www.rsmas.miami.edu/groups/niehs/niosh/.
[b] Sample size based on participants who self-reported leisure-time physical activity.
[c] Prevalence not reported when subgroup sample size is less than 25.

It is possible that workers who have substantial physical activity as part of their work activities (such as farm workers) are less likely to exercise during leisure-time. In addition, persons of lower socioeconomic status may have less access to leisure-time physical activity opportunities, particularly if they need to work longer shifts and extra jobs to survive economically. Additionally, increased educational attainment has been shown to correlate with increased leisure-time physical activities levels in both blue and white collar workers (Wu and Porell, 2000).

Several study limitations should be noted, including the use of self-reported leisure-time physical activity data which may be under- or over-estimated. It should also be noted that the extent and direction of this bias could vary across worker sub-groups (e.g. by gender and occupational category). In addition, using a one week reference period prior to the NHIS interview to characterize occupational status might also have led to misclassification of individuals with respect to their usual occupation.

Conclusions

Despite the limitations, the results of this study can be used as an indicator of overall low levels of leisure-time physical

activity in the nation; it is also important to note that while obesity levels are increasing among US workers (Caban et al., 2005), leisure-time physical activity levels are not increasing in nearly all worker groups examined in the present analysis. Additionally, the substantial increase in the prevalence of obesity among US children and adolescents (Freedman et al., 2006; Ogden et al., 2006) combined with evidence of flat or slightly increasing rates of physical inactivity in adolescents (Adams, 2006), indicates an even greater problem that employers will likely confront in the future workforce.

The health-related productivity of the American Workforce is increasingly seen as critical to business profitability. Since Americans spend an average of 8–12 h a day at work, the workplace is an ideal venue for encouraging a healthier US workforce and for implementing promotion programs to increase leisure-time physical activity levels. Physicians and other health professionals can play a pivotal role in promoting increased leisure-time physical activities levels in occupation specific patient populations (Estabrooks et al., 2003). Physicians and allied health professionals should be sensitive to individuals employed in occupations that require additional counseling to increase leisure-time physical activity levels if they are not physically active at work, particularly if there is also increased risk of obesity in these occupations. Furthermore, as industry, public health and healthcare providers attempt to coordinate the efforts of various categorical programs promoting weight loss and control, physical activity and healthy diets, new more effective strategies targeting specific worker groups identified in the present study are warranted.

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