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Injury rates from walking, gardening, weightlifting, outdoor bicycling, and aerobics

POWELL, KENNETH E.; HEATH, GREGORY W.; KRESNOW, MARCIE-JO; SACKS, JEFFREY J.; BRANCHE, CHRISTINE M.

National Center for Injury Prevention and Control and the National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA

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Address for correspondence: Kenneth E. Powell, M.D., M.P.H., Associate director for Science, Mailstop K-60, Division of Violence Prevention, National Center for Injury Prevention and Control, 4770 Buford Highway, Chamblee, GA 30341-3724. E-mail: KEP1@CDC.GOV.

ABSTRACT [TOP](#)

Injury rates from walking, gardening, weightlifting, outdoor bicycling, and aerobics. *Med. Sci. Sports Exerc.*, Vol. 30, No. 8, pp. 1246-1249, 1998.

Purpose: The objective of this survey was to estimate the frequency of injuries associated with five commonly performed moderately intense activities: walking for exercise, gardening and yard work, weightlifting, aerobic dance, and outdoor bicycling.

Methods: National estimates were derived from weighted responses of over 5,000 individuals contacted between April 28 and September 18, 1994, via random-digit dialing of U.S. residential telephone numbers. Self-reported participation in these five activities in the late spring and summer of 1994 was common, ranging from an estimated $14.5 \pm 1.2\%$ of the population for aerobics (nearly 30 million people) to $73.0 \pm 1.5\%$ for walking (about 138 million people).

Results: Among participants, the activity-specific 30-d prevalence of injury ranged from $0.9 \pm 0.5\%$ for outdoor bicycle riding to $2.4 \pm 1.3\%$ for weightlifting. The estimated number of people injured in the 30 d before their interview ranged from 330,000 for outdoor bicycle riding to 2.1 million for gardening or yard

work. Incidence rates for injuries causing reduced participation in activity were 1.1 ± 0.5 ·100 participants·30 d for walking, 1.1 ± 0.4 for gardening, and 3.3 ± 1.9 for weightlifting. During walking and gardening, men and women were equally likely to be injured, but younger people (18–44 yr) were more likely to be injured than older people (45+ yr). Injury rates were low, yet large numbers of people were injured because participation rates were high. Most injuries were minor, but injuries may reduce participation in these otherwise beneficial activities.

Conclusions: Additional studies to confirm the magnitude of the problem, to identify modifiable risk factors, and to recommend methods to reduce the frequency of such injuries are needed.

Within the past several years the health benefits of regular physical activity have been affirmed and summarized in reports from the Surgeon General of the United States (14), a National Institutes of Health Consensus Development Conference on Physical Activity and Cardiovascular Health (8), the Centers for Disease Control and Prevention and the American College of Sports Medicine (10), and the American Heart Association (1). These entities conclude that regular physical activity is associated with important health benefits: namely, reduced rates of coronary heart disease, hypertension, non-insulin-dependent diabetes mellitus, osteoporosis, colon cancer, anxiety, and depression, and improved quality of life. Importantly, they emphasize that these and probably other health benefits do not require highly strenuous activity but will accrue from participation in activities of moderate intensity. Further, they recommend that actions be taken to encourage and facilitate participation by all segments of the population in physical activity of moderate intensity.

Surprisingly little information is available about the frequency of injuries and other adverse effects of physical activity among the general population (4,6,9,14). Information is particularly sparse for injuries related to commonly performed moderately intense activities such as walking or gardening. Such data would be valuable because injuries are a health burden themselves, and they may lead to permanent reductions in activity, thereby impeding efforts to promote widespread participation. For example, among a group of recreational runners, injury was the most common reason for men and second most common reason for women to stop running (7).

As a first step toward understanding the impact of injuries from moderately intense activities, we included a few questions in a nationwide telephone survey of risk factors related to injuries. We sought information about the frequency of injuries resulting from participation in five common physical activities: walking for exercise, gardening and yard work, weightlifting, aerobic dance, and outdoor bicycling.

METHODS TOP

Data for this analysis are from the 1994 Injury Control and Risk Survey (ICARIS). Conducted between April 28 and September 18, 1994, ICARIS was based on random-digit dialing of U.S. residential telephone numbers. English- or Spanish-speaking adults (aged 18 yr and older) in all 50 states and the District of Columbia were eligible. Households in exchanges with high minority representation were oversampled to ensure adequate representation.

Respondents were asked, "During the past 30 days have you participated in any of the following: outdoor bicycle riding, aerobics or aerobic dance, weightlifting, walking for exercise, or gardening or yard work?" "Yes" or "no" responses for each activity were recorded. Those who responded "yes" to an activity were read a series of questions specifically mentioning that activity. For example, if someone responded that he/she had done weightlifting, he/she was asked, "In the past 30 days, were you injured while you were weightlifting." If "yes," the respondent was asked, "During the past 30 days, on how many occasions when you were weightlifting did you get injured severely enough that you stopped or reduced the amount of time you spent weightlifting?" Regardless of the answer

about stopping or reducing time, he/she was asked, "During the past 30 days, on how many occasions when you were weightlifting were you injured severely enough that you went for medical care or missed one-half day or more of work, housework, or school?"

Data were weighted to generate national estimates. Weights include both a selection probability weight and a poststratification weight. Selection probability weights were the inverse of the probability of selecting a particular household type and the number of telephone numbers in the household. Poststratification weights were ratio adjustments based on the March 1994 Current Population Survey number of households and the study estimates by age, race, sex, Census region, and location within a metropolitan statistical area. To account for the complex survey design, we used SUDAAN software (12) to generate weighted estimates, percents, and 95% confidence intervals (CI). If the coefficient of variation exceeded 35%, the national estimate and 95% CI are not reported. The Pearson chi-square test was used to assess the association between sex and age-group characteristics of our study population and participation and injury prevalence.

RESULTS ^{TOP}

Of 9,342 answered calls, 3,630 respondents refused participation and 474 interviews were incomplete. The final sample was 5,238 completed interviews (response rate, 56.1%).

Participation. Participation in the five activities in the late spring and summer of 1994 was common, ranging from an estimated 14.5% of the population for aerobics (nearly 30 million people) to 73.0% for walking (about 138 million people) (Table 1). Men were more likely than women to participate in gardening or yard work, weightlifting, and outdoor bicycle riding and less than likely than women to walk for exercise or do aerobics ($P < 0.01$). Younger people (18-44 yr old) were more likely than older people (45+ yr) to participate in weightlifting, outdoor bicycling, and aerobics and less likely than older people to walk for exercise or do gardening or yard work ($P < 0.01$).

Activity	Population-Prevalence of Participation				Participant-Prevalence of Injury		
	No. of respondents	No. of respondents doing activity	Weighted estimate doing activity, in thousands	Percent of population doing activity (95% CI)	No. of participants injured doing activity	Weighted estimate of injured participants, in thousands	Percent of participants injured (95% CI)
Aerobics or aerobic dance	5230	759	27,509	14.5 (13.3-15.7)	12	394	1.4 (0.5-2.3)
Male	2678	210	6,800	7.5 (6.3-8.7)	5	†	†
Female	2552	549	20,710	21.0 (19.0-23.0)	7	†	†
18-44 yr old	3095	528	18,547	17.3 (15.6-18.9)	9	†	†
45+ yr	2067	216	8,435	10.5 (8.8-12.2)	3	†	†
Gardening or yard work	5230	3514	133,932	70.6 (69.1-72.1)	64	2,131	1.6 (1.1-2.0)
Male	2679	1973	69,553	76.4 (74.5-78.3)	35	1,071	1.5 (1.0-2.1)
Female	2551	1541	64,379	65.2 (62.9-67.6)	29	1,060	1.7 (1.0-2.4)
18-44 yr old	3094	2016	72,532	67.5 (65.5-69.5)	41	1,482	2.0 (1.3-2.8)
45+ yr	2068	1454	59,867	74.8 (72.5-77.0)	19	545	0.9 (0.5-1.4)
Outdoor bicycle riding	5236	1035	38,338	20.2 (18.8-21.5)	13	330	0.9 (0.3-1.4)
Male	2681	655	22,824	25.0 (23.0-27.1)	9	†	†
Female	2555	380	15,514	15.7 (14.0-17.5)	4	†	†
18-44 yr old	3095	805	29,398	27.4 (25.4-29.3)	10	†	†
45+ yr	2073	224	8,761	10.9 (9.2-12.6)	3	†	†
Walking for exercise	5222	3792	138,408	73.0 (71.5-74.5)	51	1,877	1.4 (0.9-1.8)
Male	2673	1788	60,366	66.3 (64.2-68.5)	21	781	1.3 (0.7-1.9)
Female	2549	2004	78,042	79.1 (77.1-81.1)	30	1,096	1.4 (0.8-2.0)
18-44 yr old	3090	2170	75,755	70.6 (68.6-72.6)	33	1,348	1.8 (1.1-2.5)
45+ yr	2065	1575	61,069	76.2 (73.9-78.5)	18	529	0.9 (0.4-1.3)
Weightlifting	5236	1143	39,748	20.9 (19.6-22.3)	24	964	2.4 (1.1-3.7)
Male	2683	824	27,560	30.2 (28.1-32.3)	19	558	2.0 (1.0-3.0)
Female	2553	319	12,187	12.4 (10.7-14.0)	5	†	†
18-44 yr old	3095	928	32,024	29.8 (27.8-31.8)	23	915	2.9 (1.3-4.4)
45+ yr	2073	204	7,420	9.2 (7.7-10.8)	1	†	†

† = coefficient of variation >35.

TABLE 1. Estimated spring and summer 30-d prevalence of moderate activity participation and resulting injuries by activity, sex, and age group, USA, 1994.

Self-reported injury. Among participants, the activity-specific 30-day prevalences of injury were low, ranging from 0.9% for outdoor bicycle riding to 2.4% for weight-lifting (Table 1). The estimated number of people injured nationwide in the 30 d before their interview ranged from 330,000 for outdoor bicycle riding to 2.1 million for gardening or yard work. Despite the low injury rates, sex- and age-group-specific injury rates could be calculated for walking and gardening. Men and women had similar injury rates for walking and for gardening; however, the prevalence of injuries among younger people was about twice as high as for older people ($P < 0.05$).

Injuries requiring reduction in activity, time-loss, or treatment. Incidence rates per 100 participants for injuries causing reduced participation in the activity were 1.1 ± 0.5 per 30 d for walking, 1.1 ± 0.4 for gardening, and 3.3 ± 1.9 for weightlifting. There were too few activity-reducing injuries to calculate incidence rates for outdoor bicycling and aerobics. There were too few time-loss injuries or injuries requiring treatment to calculate incidence rates for any of the activities.

Many of the reported injuries apparently were slight. Based on unweighted numbers, about half of the people who reported an injury from walking, gardening, or bicycling said that the injury required no change in activity, time off, or medical care (Fig. 1). Roughly 30% of these people reduced or stopped participating in the activity but did not seek care or take time off; about 20% either sought medical care or missed one-half day or more of work, housework, or school. For weightlifting and aerobics nearly everyone who reported an injury reduced the level of their participation, and 25-30% sought medical care or missed one-half day or more of work, housework, or school.

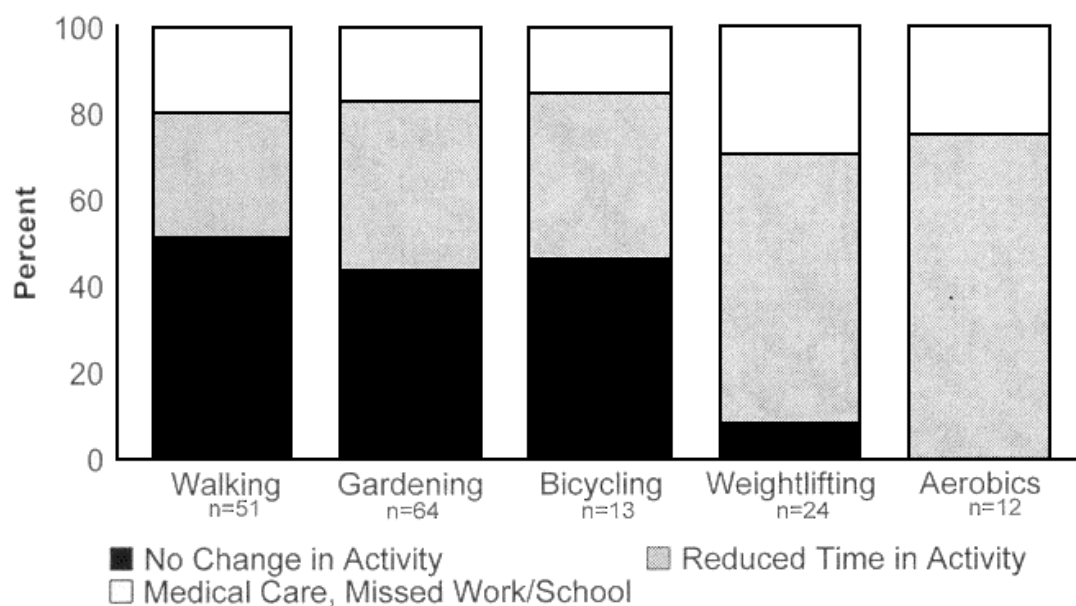


Figure 1-Unweighted distribution of injured participants by injury severity.

DISCUSSION [TOP](#)

These data suggest that the proportion of participants who suffer an activity-related injury over a 30-d period while walking, gardening, weightlifting, outdoor bicycling, and performing aerobics is low (0.9% to 2.4%), and that the 30-d incidence of injuries for walking, gardening, and weightlifting are 1.1, 1.1, and 3.3 per 100 participants, respectively. The data also indicate that about half of the self-reported injuries for walking, gardening, and bicycling did not require a reduction in participation, a visit to a medical professional, or loss of at least one-half day from work, housework, or school. Persons 45 yr or older were significantly less likely to be injured than younger persons while walking or gardening.

Although the proportion of participants reporting injuries is low, on a national scale the high participation rates yield a large number of injured people over the 30-d period, ranging from an estimated 330,000 for outdoor bicycling to 2.1 million for gardening or yard work. The number of people injured annually would, of course, be even higher; however, we chose not to project annual rates because participation in gardening, outdoor bicycling, and perhaps walking are likely to be lower from October to March.

The limited number of questions we asked led to three important limitations of our data. First, we have no information about the amount of participation (i.e., we know only that the respondent did the activity at least once in the preceding 30 d). Because time spent on activity is one of the most consistently observed risk factors for injury, injury rate estimates based upon the amount of participation would be more informative. Second, we have no information about the type and location of the injury. Third, we know nothing about the causes of the injuries, which may be intrinsic to the activity, equipment-related, or arise from conditions unrelated to the activity itself. Intrinsic injuries would include problems arising directly from the movements of the activity and would include acute strains and tears as well as "overuse" injuries. Equipment injuries would include dropping a weight on one's foot or falling because of a wet surface. Extrinsic injuries would include dog bites or collisions with motor vehicles. Rational injury-prevention activities will depend upon more information about the actual causes of the injuries.

We were surprised by the high participation rates reported for the five activities but found few data for comparison. A 1991 survey yielded an estimate that about 18% of people over 20 yr of age had ridden a bicycle (presumably outdoors) during the preceding 12 months (11); we estimated 20% of people older than 17 had ridden during the preceding 30 d. For the other four activities, the survey most similar to ours is the 1991 National Health Interview Survey (NHIS) (14). Comparing the NHIS with ICARIS, participation rates are lower in NHIS for walking for exercise (44% vs 73%), gardening or yard work (29% vs 71%), weightlifting (14% vs 21%), and aerobics or aerobic dance (7% vs 14%). The higher participation rates in our survey may result from a longer time period of inquiry (30 d vs 2 wk), more clement weather (April through September vs year-round), or attitude changes between 1991 and 1994 about how much activity justifies a positive response. Generally, self-reported physical activity data have been found reliable, but high-intensity activities appear to be more accurately recalled and reported than activities of light or moderate intensity (2.5,15).

We are unaware of similar population-based estimates for activity-specific injury rates for common physical activities, and confirmation in other studies is needed. Two studies of walkers reported injury rates of 2.5% and 3.9% when converted to monthly injury rates (3,13), both higher than our rate of 1.4%. The walkers in those studies walked 3-6 d·wk⁻¹, and the injury rates represent injuries severe enough to stop or reduce participation. Our walkers probably averaged less walking, and about half of the injuries did not require any reduction in participation.

The information about the self-reported frequency and severity of injuries associated with five common physical activities of moderate intensity brings different messages to different groups. For the public, the message is that injuries associated with these activities are uncommon and many of them so minor as to require no treatment or activity reduction. This is good news for the general population. For the medical, research, and health promotion communities there is, in addition to this primary positive message, a secondary and challenging one. The number of people doing these activities is large and, hopefully, will get larger. Therefore, although the rates of injury are low, the number of injured is large. A few of the injuries may be severe, more will require care or activity reductions, thereby burdening both the health care system and the injured individuals. Some of the injured will stop participating in physical activities altogether and will not benefit from a predominantly healthy behavior. Clearly, further study of injuries caused by commonly performed activities such as walking for exercise or gardening or yard work should be done. Such research should enable greater understanding of the frequency and risk factors for such injuries and facilitate the design of prevention efforts.

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Keywords:

INJURY RATES; PHYSICAL ACTIVITY