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Physical Activity Patterns of American Indian and Alaskan Native People Living in Alaska and the Southwestern United States

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Abstract

Purpose—Assessment of self reported physical activity (PA) and effects on health measures.

Design—Cross-sectional analysis of baseline data from a cohort study.

Setting—Education and Research Towards Health study participants from Alaska and the Southwestern United States enrolled from 2004 to 2007.

Subjects—Total of 10,372 American Indian and Alaskan Native people (AI/AN) of at least 18 years.

Measures—Participants completed computer-assisted, self-administered questionnaires, and anthropometric and health measurements were taken of each participant.

Analysis—Analysis of variance, χ^2 tests, and multiple linear regressions were used.

Results—Almost 23% of participants reported less than 30 minutes per week of moderate or vigorous activities. Half (49%) reported no vigorous activities. Characteristics associated with more time spent performing vigorous activity were male gender, age less than 40 years, higher income and education levels, and living in a rural area. Almost 70% of Alaskan participants and 36% of Southwest participants engaged in wild food-harvesting activities. Participants with higher levels of activity had significantly better clinical characteristics (high-density lipoprotein cholesterol, triglycerides, body mass index, and waist circumference).

Conclusion—AI/AS people engage in many different physical activities, including traditional harvesting activities. Women had lower levels of PA than men, and participation in vigorous PA was associated with better clinical characteristics. These data can be used to guide health promotion efforts in AI/AN populations.

Keywords

Alaskan Native; American Indian; Physical Activity; Prevention Research; Manuscript format: research; Research purpose: descriptive; Study design: nonexperimental; Outcome measure: behavioral, biometric; Setting: local community; Health focus: fitness/physical activity; Strategy: culture change; Target population age: adults; Target population circumstances: education/income level, geographic location, race/ethnicity

Introduction

Regular physical activity is associated with a broad range of health benefits, including improved cardiovascular function; lowered blood pressure; and reduced risk of certain site-specific cancers, osteoporosis, and type 2 diabetes.¹⁻³ Sedentary persons are at greater risk for all-cause mortality than nonsedentary groups.⁴ Factors significantly associated with lower physical activity levels include being in a racial/ethnic minority group, older age, urbanization, and lower socioeconomic status (income, education, and occupation).⁵⁻⁷ National trends show a decline in the percentage of people who report no leisure-time physical activity (from 29.8% in 1994 to 23.7% in 2004), but there have been insufficient sample sizes to assess national trends in American Indian and Alaskan Native (AI/AN) people specifically.⁸

Studies of AI groups, including the Strong Heart Study and the Inter-Tribal Heart Project (ITHP), have shown relatively low levels of physical activity.⁹⁻¹¹ The ITHP found that 33% of women and 21% of men reported no leisure-time physical activity, and the Strong Heart Study found from 15% to 28% of women and 10% to 25% of men reported no leisure-time physical activity. The 2005 Alaskan Behavioral Risk Factor Surveillance System (BRFSS) found that 31% of Alaskan Native respondents reported no leisure-time physical activity during the past month, compared with 20% of non-Native respondents.¹² The 1991-1992 Navajo Health and Nutrition Survey reported 30% of Navajo women and 20% of Navajo men reported no leisure-time physical activity in the past month.¹³

The Strong Heart Study found a significant positive association between increased physical activity and apolipoprotein A-I in AI people. High-density lipoprotein (HDL)-c and apolipoprotein AT have a protective effect against coronary heart disease⁹ and are inversely associated with fasting insulin levels¹⁴ and lower mean body mass indices (BMIs).¹⁵

The Education and Research Towards Health (EARTH) Study is a multicenter study of AI/AN people designed to examine factors related to chronic diseases. Data were collected on a wide range of physical activities, including activities at leisure, work, and around the house; for transportation; and during traditional activities. This report describes current physical activity patterns and their relation to various sociodemographic characteristics among 10,372 EARTH study participants from the Southwestern United States and Alaska. The association between physical activity and health measurements among this large cohort of AI/AN people is also examined.

Methods

Study Population

The study population, data collection methods, and measurement instruments for the EARTH Study have been described in detail elsewhere.¹⁶ Participants from Alaska were recruited from 26 different communities statewide, many of which are located off the road system and accessible only by airplane, with seasonal access by snow machine or boat.

Participants from the Southwestern United States were recruited from two stationary locations in northern New Mexico and Arizona and in a mobile van that traveled from community to community in this same area. Enrollment was available to all persons who were AI/AN and eligible for health care through the Indian Health Service, at least 18 years, able to give informed consent, not currently pregnant, and not currently on chemotherapy. This report considers data collected from 10,372 participants enrolled in the study from March 2004 through March 2007. Of the study participants, 1.1% (n = 114) did not do the physical activity questionnaire at all, and 431 (4.2%) were missing answers for at least one of the physical activity questions.

Data Collection

EARTH participants completed self- and interviewer-administered questionnaires on demographics, diet, physical activity, lifestyle and cultural practices, environmental exposures, cancer screening practices, medical and reproductive history, and family history of chronic diseases. Medical tests at the baseline study visit were seated blood pressure, fasting serum lipid and glucose levels, height, weight, and waist/hip circumferences. Participants were asked to fast for at least 9 hours. Blood pressure was measured using the Omron HEM-907 automatic blood pressure device.¹⁷ Fasting glucose and lipid panels were measured on a blood sample obtained by finger-stick using the Cholestech LDX system (Cholestech, Hayward, Calif).¹⁸ Measurements for height, weight, and waist/hip circumferences were taken in duplicate, and the average of the two used for analysis. Participants completed the physical activity questionnaire by using computer-assisted self-interviews on touch-screen panels while listening to an audio version of the questionnaire by headphones in English, Yupik, or Diné. The study protocol was approved by the Alaska Area Institutional Review Board (IRB), Navajo Nation Human Research Review Board, Indian Health Services IRB, University of Utah IRB, research and ethics committees and governing boards of each of the participating regional health corporations, and tribal councils of the participating communities. All participants signed informed consent forms before participating in the study.

Measurement of Physical Activity

The format of the EARTH Study physical activity questions was adapted from the Multi-Ethnic Study of Atherosclerosis (MESA) and Taylor physical activity questionnaires.^{19, 20} As in the MESA questionnaire, queries about frequently performed activities like walking addressed activities performed during a typical week in the past month and included activities that are done regularly throughout the year (including household activities and sedentary activities). Questions about activities that are less frequently performed (traditional activities, leisure activities, and occupational activities) were asked in the manner of the Taylor questionnaire; participants chose from a list of individual activities and specified the length of time and frequency at which they were performed, for all activities, participants were asked to include only those lasting more than 10 minutes at a time, specify the days per week (or per month as applicable) of the activity, and specify the average time spent on each activity. The activities queried encompass the majority of sources of physical activity of the AI/AN populations included in the study (Table 1) and were identified with input from tribal leaders and local community members. Many of the traditional activities, common among these particular populations, are rare or nonexistent in other populations.

Data Analysis

A metabolic equivalent (MET) value was assigned to each reported activity according to the Compendium of Physical Activities.²¹ Many Alaskan traditional activities do not have measured MET values on record, and thus a MET value was assigned based on activities of

similar intensity. Moderate physical activities were activities with MET values ranging from 4.0 to 5.9, and vigorous physical activities were activities with MET values 6.0 and greater.

Summary statistics were calculated, and they provide an overview of the characteristics of EARTH study participants. The demographic and socioeconomic variables analyzed included age at study visit, sex, educational level, employment and marital status, income, resident community size (urban was based on the 2000 U.S. Census definition of a population of 50,000), and language spoken at home. Chi-square tests for proportion differences were used to compare all activities queried in the EARTH study physical activity questionnaire by study centers, sex, and age groups.

A validation substudy that compared the computerized EARTH physical activity questionnaire with 2-day physical activity logs found that validity was higher for vigorous activity (adjusted Pearson $R = .64$) than for moderate activity (adjusted Pearson $r = .36$) (Murtaugh et al., unpublished data, 2007). Prior to data analysis, we determined the degree of overlap between reported moderate and vigorous activities. Of participants who reported medium to high amounts of vigorous activity, the majority (82%) also reported medium to high amounts of moderate activity; of those who reported low amounts of vigorous activity, about half (48%) reported low amounts of moderate activity (Pearson $r = .38$, $p < .01$; data not shown). Similar sociodemographic patterns and associations with clinical health measures were found within the moderate and vigorous physical activity categories. Therefore, vigorous activity was used for all analyses presented.

To categorize participants, we summed total hours per week of vigorous physical activity. We grouped those who reported no vigorous activity separately. Following the methodology of Suijkerbuijk et al.²² and Pitsavos et al.,²³ we divided the values of those who reported any vigorous activity into tertiles based on the distribution of our study population. We then added those with no activity to the lowest category. The three categories based on these groupings were none to low (0–0.49 hours/week), medium (0.5–2.99 hours/week), and high (≥ 3 hours/week). Associations between vigorous physical activity level (low, medium, high) and demographic characteristics were analyzed using χ^2 testing. In addition, the association of self-reported health status (categorized as excellent/very good/good vs. fair/poor) with vigorous physical activity level was analyzed using χ^2 testing.

Mean values of health measurements (BMI, waist/hip ratio, waist circumference, total cholesterol, triglyceride, HDL cholesterol, low-density lipoprotein (LDL) cholesterol, blood glucose, systolic blood pressure, and diastolic blood pressure) were calculated. Multiple linear regression analysis was used to determine the contribution of vigorous physical activity in hours per week (analyzed as a continuous variable) to variation in health measurements. The linear regression analysis was adjusted for potential confounders, including age, sex, EARTH study site, marital status, education, employment, income, education, and BMI (BMI was included as a covariate when it was not the outcome measure). Models were not substantially improved by the addition of two-way interactions (education by income, income by employment, education by age), and thus only main effects are included in the final models. Adding a term for moderate physical activity (hours/week) to the models also did not alter conclusions of the effect of vigorous activity on health measurements (data not shown). Because of concerns that overreporting of activity hours would impact the models, the multivariate analysis excluded participants reporting more than 30 hours per week of vigorous activity. The cut point was set at the 98th percentile of our study population, following the methodology of the European Prospective Investigation into Cancer and Nutrition study.²² All analyses were conducted with the SPSS version 15.0 (SPSS, Inc., Chicago, Ill); $p \leq .05$ was considered to be statistically significant.

Results

Demographic Characteristics

Demographic descriptions of the Alaskan (N = 3830) and Southwestern U.S. (N = 6542) study populations are shown in Table 2. Participants in the EARTH Study ranged from 18 to 94 years (median, 40.0) at the time of recruitment. More women than men were enrolled in the study (63% vs. 38%), with a slightly higher proportion of men enrolled in the Alaskan study center ($p < .01$). About one-fourth of participants (26%) had not completed high school. Distributions of participants in both Alaska and the Southwest were similar in age, sex, education, employment, and marital status. Compared with the Southwest, the Alaskan study center had a smaller proportion of low-income participants (41.1%, vs. 53.8%); Alaskan participants were less likely to speak a language other than English at home (33.2% vs. 70.7%); and Alaskan participants were less likely to live in rural areas (63.5% vs. 95.3%).

Prevalence of Physical Activities

The number and percent of participants reporting specific physical activities is shown in Table 3. Less than one-quarter (21%) of the study population were in occupations that require heavy physical effort. The most frequent physical activities reported were household chores (including care of dependents), outdoor chores, and walking to get places. Specific activities differed among study centers. Alaskans were much less likely than those in the Southwestern United States to report performing outdoor chores, walking for exercise, jogging, stretching, or horseback riding but much more likely to walk to get places and participate in traditional activities and in traditional dance ($p < .01$ for all comparisons). Younger participants (<40 years) were more likely to perform almost all activities than older respondents, with the notable exception of traditional dance, in which older respondents were more likely to participate ($p < .01$). For traditional activities, participation levels were equal across age groups ($p = .10$). More men than women reported participation in all activities except for walking for exercise, aerobics, and dance, which were more commonly reported by women ($p < .01$ for all). There was no difference by gender in reporting of household chores and care of dependents ($p = .57$).

EARTH study participants were also queried about common sedentary activities. Participation in sedentary activities was higher in Alaska than the Southwestern United States ($p < .01$). More men than women reported riding in vehicles and sitting watching television; however, women more frequently reported participating in “quiet activities” (reading, sewing, beading, caning, computer use) ($p < .01$ for all). Participation in sedentary activities was higher for those under 40 years than over age 40 ($p < .01$) except for quiet activities, in which participation was fairly equal among the two age groups ($p = .76$).

Physical Activity, Sociodemographic, and Clinical Characteristics

Almost one-quarter (23%) of EARTH study participants reported no or minimal participation (<.5 hour/week) in either moderate (4–6 METs) or vigorous activities (>6 METs), 32% reported no or minimal moderate physical activity, and 49% reported no or minimal vigorous physical activity.

Sociodemographic characteristics of participants across differing amounts (none to low, medium, high) of reported vigorous physical activity are presented in Table 4. Participants in the Southwest were more likely to report high levels of vigorous physical activity. Participants who reported more vigorous activity were more likely to be male, be younger, indicate higher income and education levels, be single, be employed, live in rural areas, and consider their health status as good to excellent ($p < .01$ for all comparisons).

Clinical characteristics of EARTH study participants are presented in Table 5. In multivariate analysis, increasing reported hours per week of vigorous physical activity was associated with lower BMI, waist/hip ratio, waist circumference, and level of triglycerides and higher HDL cholesterol level and systolic blood pressure ($p < .01$ for each). No significant association was found between higher levels of vigorous physical activity and total cholesterol, LDL cholesterol, blood glucose, and diastolic blood pressure.

Discussion

The EARTH Study is one of only a few studies that has examined levels of physical activity and associated factors among AI/AN people. This study focused on persons living in Alaska and the Southwestern United States. This study included a comprehensive range of activities, particularly activities unique to these populations. The inclusion of both urban residents and residents of remote rural communities with no road access and few motorized vehicles afforded an assessment of physical activity patterns across a wide spectrum of lifestyles. Although the study population was not a random sample, the distribution of the two populations closely resembled the distribution by age and marital status reported by the 2000 U.S. Census for AI/AN in the respective regions (data not shown). When compared with data for the general U.S. population, the EARTH study population was more rural (83.5% vs. 21%), had a higher proportion who did not complete high school (26% vs. 15%), had more people who spoke a language other than English at home (57% vs. 18%), and had a lower median household income (\$20,000 vs. \$46,000).^{24–27}

Other surveys of AI/AN people examining leisure time and physical conditioning activities have found women to be less active than men.^{28,29} Our findings are consistent with these results. Other studies have proposed that household chores and care of dependents may provide an unmeasured source of activity in women.^{6,30} However, our study measured reported household activity and found it equally distributed among men and women. Therefore, participation in domestic activities is unlikely to account for the differences in overall activity between men and women reported in our and other studies.

Our findings that engagement in physical activity was more often reported by younger participants, men, and participants who reported higher education levels were consistent with studies in other populations.^{31,32} We also found that participants who lived in rural areas (with few or nonexistent roads) reported more physical activity than did urban participants, which agrees with the results of some, but not all, other studies.^{33,34} Differences in activity level may be related to variations in socioeconomic status, as well as varying degrees of geographic isolation included in the standard rural definition.

Physical activity is associated with cardiovascular health through its beneficial effect on blood lipid levels and blood pressure. The EARTH Study found that participants with higher levels of activity had better health measurements, even after adjustment for confounders. The beneficial effects of physical activity observed are similar to results observed in an Alaskan study of 556 Yupik Eskimo people and 110 Athabascan people 40 years and older, which found a negative association between participation in traditional physical activities and glucose intolerance,³⁵ and results of the Strong Heart Study, which found significant positive correlation between more favorable blood lipid values and increased physical activity.⁹ Because the EARTH study data were cross sectional, it was not possible to identify any causal relationships, especially with respect to association of physical activity and health-related factors. We hope that prospective follow-up of this cohort will help to resolve these issues in the future.

The EARTH study questionnaire collected hours per day of physical activity and did not specifically ask the number of days per week on which each activity occurred. Although these data are therefore not directly comparable to national data from BRFSS,³⁶ the prevalence of total physical activity in the EARTH Study fell within ranges reported among AI in the Strong Heart Study⁹ and ITHP.¹¹ Similar to both of these studies of AI, the EARTH Study found walking to be the most common physical activity reported. EARTH study participants reported watching an average of 1.7 hours per day of television (data not shown), less than the 3 hours per day reported in the Strong Heart Study³⁷ and much lower than the 4.5 hours per day reported for the general U.S. population.³⁸

The EARTH Study was a self-administered, computer-assisted questionnaire with an audio recording of all questions, which included 50 distinct physical activities. Participants were asked to recall multiple activities and respond with the average time usually spent in each activity. As such, respondents at times likely overestimated—or less likely, underestimated—their total participation in physical activities. To help mitigate the effects of such reporting error, reported hours were grouped into three levels of physical activity categories for much of this analysis. Other sources of reporting inconsistency include possible different interpretations of several words or terms from the questionnaire: however, Yupik and Diné translation was available, and the questionnaire was pilot tested with tribal members in each area multiple times prior to administration of the questionnaire to study participants.

This study did not investigate possible social or physical environmental influences on physical activity. Previous literature has detailed the role social environmental factors play in physical activity decisions, particularly among Native American women.²⁹ Recent work has also explored the relation between the built environment and levels of physical activity.^{39,40} The relation between the built environment and physical activity is complex, operating through many mediating factors including sociodemographic characteristics, personal and cultural values, safety and security, and time allocation.⁴¹ Little is known about how the unique environmental characteristics of rural communities serve to help or hinder participation in physical activities, but it is a topic that deserves greater exploration and consideration as health promotion programs are initiated.

This study adds to the literature on the association of physical activity with BMI and HDL cholesterol, provides heretofore unknown information on the wide range of physical activities that AI/AN people participate in daily, and demonstrates that these groups continue to engage in a substantial amount of traditional activities. The physical activity involved in traditional activities, including food harvesting, combined with the high nutritional value of Native foods may provide a double benefit to decreasing the risks for chronic disease. Identification of the types and frequencies of physical activities of AI/AN people can also assist in designing future health promotion efforts for these populations.

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SO WHAT? Implications for Health Promotion Practitioners and Researchers

The EARTH Study is one of only a few studies that has examined levels of physical activity and associated factors among AI/AN people. The results of this study provide a more complete picture of the distribution of physical activities performed by these populations than has existed to date. It also provides insight into sociodemographic associations with vigorous physical activity. In addition, this study adds to the literature on the cross-sectional association of physical activity and health factors. This provides valuable baseline data for future prospective study and for health promotion efforts in these populations.

Table 1
List of Physical Activities in Questionnaire and Their Associated METs

Type of Activity	MET Value
Traditional activities	
Hunt big or small game on foot	5.0–6.0
Dog sledding	5.5
Hunt marine mammals	5.0
Work on animal skins or tan hides	3.5
Trap	3.0
Pick berries or greens	3.0
Fish	3.0
Hunt big or small game on foot or by vehicle	2.0
Cut and/or smoke fish, or butcher game	2.0
Leisure activities	
Bike outdoors	8.0
Canoe, kayak, or row	7.0
Swim	7.0
Winter sports: cross-country ski, downhill ski, snowboard, snowshoe	6.0–8.0
Hike, run, or jog	6.0–7.0
Aerobics, water aerobics, or kickboxing	6.5
Strength train or weight lift	6.0
Team sports: basketball, baseball, softball, soccer, tennis, other racket sports, volleyball, bowling	5.0–8.0
Work out on an exercise bike, Stair Master, or other exercise machine	5.5
Traditional (including powwow and ceremonial) and nontraditional dance	4.5–5.5
Rodeo	5.0
Horseback ride	4.0
Golf	3.8
Walk to get places or for exercise	2.5–3.8
Alaskan Native sports	3.5
Stretching or yoga	2.5
Occupational activities	
Moderate or heavy effort labor at a paid job	5.5
Household activities	
Moderate or heavy effort at outside chores (shoveling snow, chopping wood, hauling water)	4.0–5.5
Light and moderate effort at care of dependents	2.75–4.0
Light and moderate effort at household chores	2.5–3.5
Sedentary activities	
Driving or riding in a vehicle	2.5
Sitting, reclining, watching television	1.0
Reading, sewing, beading, carving, using a computer	1.0

MET indicates metabolic equivalent.

Table 2
Demographic Characteristics of Alaskan and Southwestern U.S. EARTH Study Participants

	No. of Alaskan Participants (%)	No. of Southwestern U.S. Participants (%)	Total No. of Participants (%)
Total	3830 (36.9)	6542 (63.1)	10,372
Age group, y			
18–39	1879 (49.1)	3264 (49.9)	5143 (49.6)
40–59	1519 (39.7)	2680 (41.0)	4199 (40.5)
60	432 (11.3)	598 (9.1)	1030 (9.9)
Sex			
Male	1507 (39.3)	2378 (36.3)	3885 (37.5)
Female	2323 (60.7)	4164 (63.7)	6487 (62.5)
Education			
Less than high school	890 (23.3)	1766 (27.0)	2656 (25.6)
High school or higher	2937 (76.7)	4771 (73.0)	7708 (74.4)
Employment status			
Employed or self-employed	1720 (45.1)	2802 (42.8)	4522 (43.7)
Not currently employed	2096 (54.9)	3738 (57.2)	5834 (56.3)
Marital status			
Married/living as married	1633 (42.8)	2880 (44.1)	4513 (43.6)
Separated/divorced/never married	2182 (57.2)	3653 (55.9)	5835 (56.4)
Income			
\$15,000	1343 (41.1)	2971 (53.8)	4314 (49.1)
>\$15,000	1926 (58.9)	2554 (46.1)	4480 (50.9)
Residency			
Urban	1397 (36.5)	307 (4.7)	1704 (16.5)
Rural	2433 (63.5)	6208 (95.3)	8641 (83.5)
Language spoken at home			
Both Native and English	962 (25.2)	3791 (59.4)	4753 (46.6)
English only	2547 (66.8)	1870 (29.3)	4417 (43.3)
Native only	303 (7.9)	722 (11.3)	1025 (10.0)

EARTH indicates Education and Research Towards Health.

Table 3
Number and Percent of Participants Reporting Activities by Sex, Age, and EARTH Study Center*

Activity	Center			Sex		Age, y	
	Total	Alaska	Southwest	Male	Female	18–39	40
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Household chores/care of dependents	8079 (77.9)	2850 (74.4)	5229 (79.9)	3038 (78.2)	5041 (77.7)	4317 (84.0)	3760 (71.9)
Outdoor chores	6681 (64.4)	1841 (48.1)	4840 (74.0)	2869 (73.8)	3812 (58.8)	3386 (65.8)	3297 (63.0)
Occupational	2172 (21.2)	742 (19.5)	1430 (22.3)	1437 (37.5)	735 (11.5)	1321 (25.9)	851 (16.6)
Traditional activities	5050 (48.7)	2674 (69.8)	2376 (36.3)	2129 (54.8)	2921 (45.0)	2595 (50.5)	2726 (52.1)
Leisure-time activities [†]							
Walk to get places	7181 (70.1)	3034 (79.3)	4147 (64.6)	2851 (74.3)	4330 (67.6)	3652 (71.6)	3527 (68.6)
Walk for exercise	5798 (56.6)	1623 (42.4)	4175 (65.0)	1831 (47.7)	3967 (61.9)	2861 (56.1)	2936 (57.1)
Jog	4291 (41.9)	1225 (32.1)	3066 (47.8)	1829 (47.8)	2462 (38.4)	2621 (51.4)	1670 (32.5)
Swim	2333 (22.8)	943 (24.7)	1390 (21.6)	1007 (26.2)	1326 (20.7)	1663 (32.6)	670 (13.0)
Stretch	6407 (62.5)	1948 (51.0)	4459 (69.4)	2394 (62.4)	4013 (62.6)	3319 (65.1)	3088 (60.1)
Aerobics	922 (9.0)	256 (6.7)	666 (10.4)	243 (6.3)	679 (10.6)	583 (11.4)	338 (6.6)
Traditional dance	1243 (12.1)	734 (19.2)	509 (7.9)	392 (10.2)	851 (13.3)	540 (10.6)	703 (13.7)
Other dance	2101 (20.5)	941 (24.6)	1160 (18.1)	594 (15.5)	1507 (23.3)	1245 (24.4)	855 (16.7)
Hike	2192 (21.4)	653 (17.1)	1539 (24.0)	1102 (28.7)	1090 (17.0)	1260 (24.7)	932 (18.1)
Bicycle	2427 (23.7)	1000 (26.2)	1427 (22.2)	1320 (34.4)	1107 (17.3)	1618 (31.7)	809 (15.7)
Horseback riding	1245 (12.2)	55 (1.4)	1190 (18.5)	718 (18.7)	527 (8.2)	754 (14.8)	491 (9.6)
Exercise machine	2703 (26.4)	854 (22.3)	1849 (28.8)	1106 (28.9)	1597 (24.9)	1558 (30.5)	1145 (22.3)
Strength training	2998 (29.3)	949 (24.8)	2049 (31.9)	1744 (45.5)	1254 (19.6)	1999 (39.2)	999 (19.4)
Canoe	567 (5.5)	370 (9.7)	197 (3.1)	351 (9.1)	216 (3.4)	317 (6.2)	250 (4.9)
Team sports	3286 (31.7)	999 (26.1)	2287 (35.0)	1550 (39.9)	1736 (26.8)	2437 (47.4)	849 (16.2)
Sedentary activities							
Vehicle use	9104 (88.8)	3404 (89.0)	5700 (88.8)	3389 (88.3)	5715 (89.2)	4674 (91.7)	4428 (86.0)
Sit/watch TV	9007 (87.9)	3556 (93.1)	5451 (84.8)	3331 (86.8)	5676 (88.6)	4618 (90.5)	4387 (85.3)
Quiet activities [‡]	7917 (77.5)	3007 (79.0)	4910 (76.6)	2572 (67.3)	5345 (83.6)	3952 (77.6)	3963 (77.4)

[†]Less than 5% of respondents participated in the following activities: Native sports, rodeo, and winter sports.

* Quiet activities include reading, sewing, beading, carving, and computer use.
 * $p < 0.01$ for all comparisons except center comparison of vehicle use, gender comparisons of stretching and vehicle use, and age comparisons of traditional activities, walking for exercise, and quiet activities.

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Table 4
Distribution of Vigorous Physical Activity (≥ 6.0 METs) by Sociodemographic and Health Status Responses (N = 10,258)*

	No or Minimal Physical Activity (0–0.49 h/wk; N = 5039) No. (%)	Medium Physical Activity (0.5–2.99 h/wk; N = 2525) No. (%)	High Physical Activity (≥ 3 h/wk; N = 2694) No. (%)
Center			
Alaska	2044 (40.6)	857 (33.9)	926 (34.4)
Southwest	2995 (59.4)	1668 (66.1)	1768 (65.6)
Sex			
Male	1266 (25.1)	983 (38.9)	1595 (59.2)
Female	3773 (74.9)	1542 (61.1)	1099 (40.8)
Age categories			
18–39 years	1880 (37.3)	1440 (57.0)	1784 (66.2)
40–59 years	2391 (47.4)	946 (37.5)	805 (29.9)
60 years	768 (15.2)	139 (5.5)	105 (3.9)
Income			
\$15,000	2226 (51.4)	1002 (46.2)	1086 (47.3)
>\$15,000	2103 (48.6)	1168 (53.8)	1209 (52.7)
Education			
Less than high school	1442 (28.6)	536 (21.2)	641 (23.8)
High school or higher	3594 (71.4)	1987 (78.8)	2050 (76.2)
Marital status			
Married/living as married	2433 (48.4)	1112 (44.2)	910 (33.8)
Separated/divorced/never married	2594 (51.6)	1406 (55.8)	1779 (66.2)
Employment status			
Employed or self-employed	2100 (41.7)	1217 (48.3)	1140 (42.4)
Not currently employed	2932 (58.3)	1304 (51.7)	1549 (57.6)
Residency			
Urban	871 (17.3)	448 (17.8)	373 (13.9)
Rural	4159 (82.7)	2072 (82.2)	2314 (86.1)
Self-reported health status			
Excellent/very good/good	3404 (67.8)	1913 (75.8)	2203 (82.0)
Fair/poor	1617 (32.2)	610 (24.2)	485 (18.0)

* $p < 0.01$ for all tests (tests of association between each demographic/health status measurement above and category of vigorous physical activity). MET indicates metabolic equivalent.

Table 5
Clinical Characteristics by Level of Vigorous Physical Activity (Hours/Week) for EARTH Study Participants (N = 10,062)[†]

	Mean	SD	N	$\beta^{\ddagger}$	P^*	t
Body mass index (kg/m ²)	30.4	6.6	10,035	-0.144	<0.001	-9.07
Waist/hip ratio	0.910	0.076	10,019	-0.001	<0.001	-5.47
Waist circumference (inches)	39.5	5.9	10,019	-0.031	<0.001	-5.38
Total cholesterol (mg/dL)	191.3	40.6	10,083	0.020	0.838	0.20
Triglyceride (mg/dL)	149.1	98.0	8769	-0.749	0.002	-3.04
HDL cholesterol (mg/dL)	52.0	16.8	9999	0.128	0.001	3.39
LDL cholesterol (mg/dL)	109.8	35.2	8107	-0.081	0.378	-0.88
Glucose (mg/dL)	104.5	34.2	8780	-0.112	0.204	-1.27
Systolic blood pressure (mm Hg)	117.3	14.5	10,210	0.097	0.003	3.00
Diastolic blood pressure (mm Hg)	71.7	10.5	10,210	-0.031	0.199	-1.28

[†]Swimming (MET = 7.0) was excluded in the continuous vigorous physical activity variable because of perceived unreliable reporting for this activity.

[‡]Estimated coefficient of vigorous physical activity (h/wk) from multiple linear regression of health measurement on vigorous physical activity adjusting for age, sex, EARTH study region, marital status, education, employment, income, and body mass index (included as a covariate when not the outcome measurement).

* p for linear trend; probability the estimated coefficient of vigorous physical activity is different than zero.

EARTH indicates Education and Research Towards Health; HDL, high-density lipoprotein; LDL, low-density lipoprotein; and MET, metabolic equivalent.