GET UP AND MOVE: INDEPENDENCE AND MANEUVERABILITY RELATED TO REGULAR EXERCISE AMONG NONINSTITUTIONALIZED ELDERLY ADULTS

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Abstract

In today’s society, the baby boomer generation is ageing and adults are living longer, healthier lives. Studies have proven that exercise can benefit individual health and mobility. Data for this study was taken from the 2001 edition of the National Health Interview Survey and focused on the interview population over the age of 65. Using logistic regression analysis with the SUDANN statistical software, the relationships of regular exercise and difficulty experienced during mobility tasks was examined. Older adults were less likely to exercise five or more times a week than younger adults and experience more difficulty in tasks such as standing for extended periods and walking up steps. The results of this study could be helpful in discerning which adults would benefit from exercise intervention and if there are any health benefits from regular exercise.

Literature Review

The purpose of this literature review is to examine the progress made in research and exercise benefits for the elderly population. As the body ages, muscles lose strength. Other factors can also limit an older person’s ability to perform everyday tasks. There are validated tests for measuring fitness for older adults, as well as different methods for exercise intervention in older individuals.
Characteristics of the Elderly

Due to the ageing of the baby boomer generation and the increases in medical technology to treat disease, the number of elderly adults is rising. Common traits of the aging body include decreases in: muscle strength, bone mass, respiratory-muscle function, flexibility, maximum heart rate, and maximum oxygen intake (Balady, 2000; Watsford, 2005). The loss of some of these traits, combined with the decreasing amount of physical exercise and activity, could lead to health problems and the loss of independence. With advancing age, the prevalence rates for fair or poor health, most chronic health conditions, sensory impairments, and difficulties with physical and social activities increases (Schoenborn, 2006). Studies show that elderly people cannot be lumped into one large category. Sex and age help determine a person’s physical limitations (Steffen, 2002). Adults with greater self-efficacy (confidence in their ability to reach personal goals) and self-regulation of their physical activity are more likely to be physically active (Umstattd, 2006). Some common barriers to exercise include the lack of motivation, time, fear of falling, disease, and lack of social encouragement (Struck, 2006). Research has shown greater self-efficacy for physical activity in males, African Americans, younger individuals, older adults, those with higher education, and those who are physically active (Umstattd, 2006).

Of the sociodemographic variations influencing health behavior, one of the most is consistent findings for older adults is that those who are poor, near poor, or without private health insurance was to have much higher rates of health problems, and lower rates of healthy behaviors than non-poor or privately insured adults (Schoenborn, 2006).

Testing and Exercise

Different standardized tests are available to measure a person’s physical abilities and establish some sense of development norms. Some of these tests include: the six-minute walk
test which measures peak oxygen uptake, Berg Balance Scale which measures different mobility
tasks, timed up and go test which measures balance and mobility while rising from a chair,
walking a distance, and returning to the chair, and comfortable and fast gait speed which
measures the ability to change walking paces (Steffen, 2002). The common recommendation for
older people is to exercise 30 minutes a day five days a week with activities ranging from high
intensity walking or swimming to less intense activities, such as gardening (Balady, 2000;
Struck, 2006). Exercise programs should look at each individual and provide him or her with
stimulating routines that are within their functioning capacity.

Results of Exercise

The general belief is that exercise and flexibility training can improve the health of
individuals. Traditional studies focus on issues such as muscle mass and endurance, but
nontraditional testing can be useful in examining a wider range of health benefits from exercise,
such as reaction speed (Bakken, 2001). Studies have shown that exercise can slow muscle loss
and improve older people’s ability to interact with their environment with less risk of injury
(Balady, 2000; Steffen, 2002; Watsford, 2005). If these results are true, older adults should be
encouraged to exercise to improve their quality of life. Exercise intervention could include
behavioral modification, commitment contracting, health education, and social support (Conn,
2006; Struck, 2006). Intervention often is more effective when recommended by the individual’s
physician (Struck, 2006).

Conclusion

All of these successful traditional studies warrant further examination of the health
benefits of exercise for elderly adults. Different factors can affect a person’s ability to maintain a
healthy lifestyle including their cultural background, available resources, social environment,
and motivation. One of the goals for the future should be to get sedentary adults into an exercise program. In order to reach this goal, emphasis needs to be on increasing awareness among the older population and providing exercise options that match their ability.

**Research Methods**

This project uses data from the National Health Interview Study taken in 2001 which asks participants about a set of basic health and demographic items as well as one or more sets of questions on current health topics that vary with each survey (NCHS, 2003). From each sampled family, one adult and one child are randomly selected as the target of the study. This survey is the principle source of information on the health of the civilian, noninstitutionalized, household population of the United States (NCHS, 2003).

The focus of this paper is on the interviewed population of adults age 65 and older from the National Health Interview Survey and will include 6,146 cases. Comparisons will be made with the adults younger than 65 to give a total interview population of 33,326 adults. The primary variables to be examined are whether the person exercises on a regular basis and the difficulty they encounter performing different movements and tasks. Confounding factors that will have to be explored include age, sex, race, education, marital status, and access to healthcare. Regular exercise is defined, at a minimum, to be moderate activity 5 times a week for 30 minute durations. Vigorous exercise and strength training (seen less in the elderly population) will also be examined as occurring at least five times a week. The difficulty experienced in mobility tasks will include the ability to walk certain distances, sit/stand for prolonged periods of time, and the ability to manipulate (push/pull/grasp) objects.
Logistic regression analysis will be used because the exercise and difficulty of tasks variables will be measured as binary (they reach the threshold or do not). SAS statistical software was used to perform logistic regressions and calculate correlations between variables. Ordinary least squares as adjusted by SUDAAN is used in the study of the continuous body mass index variable. The hypothesis to be tested is that adults 65 and older who regularly exercise will experience less difficulty in performing different mobility tasks. Also I hypothesize that the percentage of exercising will decrease with age and difficulty in activities of daily living will increase. The results of this study could be helpful in discerning which adults would benefit from exercise intervention and if there is any health benefit from regular exercise.

Findings:

Using data from the National Health Interview Survey Adult Health Behavior section (NCHS, 2003), the following analyses focused mostly on the physical activity of adults and the amount of difficulty they experience with different everyday movements. Data were weighted to the population of the nation to counteract the over sampling that occurred in minority groups and the aged. In order to better view any cohort effects of the surveyed adults 18 years of age and older they were broken down into seven age groups: Youngest (born post 1975), Younger than Boomer (born 1966-1975), Young Boomer (born 1956 – 1965), Old Boomer (born 1946 – 1955), Older than Boomer (born 1936 – 1945), Young Older (born 1926 – 1935) and Oldest Old (born pre-1926). In the survey year of 2001 the youngest group was less than 25 and the oldest group was over 75 years of age (Swan, 2005).

Table 1 reports the percentage of each group that exercises at least five times per week at a moderate, vigorous, or strengthening level. Of individuals in the youngest age cohort, 31.4
percent reported exercising at a moderate level five or more times a week, compared to only 25.24 percent in the younger than boomer category. The rest of the cohorts were also in the 25 percent range until the oldest category where it dropped to 18.36 percent. This trend is similar with those who exercise vigorously five or more times a week with 18.04 percent of the youngest reported this exercise level, followed by a plateau at around 13 percent and finally a drop to 4.62 percent in the oldest category. In all three types of exercise an interesting trend occurs as the drop from the youngest group to the younger than boomer group is followed by a plateau through most of the age groups. Only with the oldest group is another drop witnessed. The strengthening data differs in that the oldest cohort has a slightly higher percentage of 5.26 percent compared to the two preceding groups and the plateau of around 5 percent and the youngest group at 9.95 percent. An overall trend of decreasing activity with age is counteracted by a cohort effect.

Table 2 reports logistic regression of individuals’ participation in any exercise activity at least five times per week, with and without controls, with the youngest cohort as the contrast category. Without controls, the young boomer, old boomer, older-than-boomer, and young old categories all appear to exercise as much as the youngest. The younger than boomer category appears to be about 27 percent less likely to exercise while the oldest category is about 35 percent less likely. Table 2 also reports the analysis of individuals exercising five times a week with the addition of control variables: age (in 10 years increments), sex, race (African American, Hispanic, and White as the contrast group), marital status, education, and whether they have visited a therapist or chiropractor. The controls for education are divided into three categories: at least a high school degree, at least some college, and at least a college degree. The addition of control variables still only partially explains the difference among the different cohorts. Males were 22 percent more likely than women to participate in any moderate, vigorous, or
strengthening activity five or more times a week. Those with higher education were also proven more likely to exercise. The individuals with at least a high school diploma were 28 percent more likely to exercise, at least some college were 24 percent more likely, and at least a college degree were 8 percent more likely. Hispanic were 38 percent less likely and African Americans 28 percent less likely to exercise five times a week than white Americans. The cohort variables measure cohort effects, but to distinguish changes in individual age the age in 10 years variable was used. Since all but the youngest and oldest old cohort are ten years long, age is divided by ten to scale age to cohort. This compares the effect of a ten-year cohort to an age-related change over a ten-year period. For every 10 years of age, adults are 23 percent less likely to exercise five times a week. The effects of visiting a general doctor or specialist in the past 12 months were tested and found to have no real significance, and only confounded the data. Those individuals who reported having seen a chiropractor in the last 12 months were 18 percent more likely to exercise than those who did not. Similarly, those who have seen a physical or occupational therapist were 12 percent more likely to exercise.

Different mobility tasks were measured by the survey population according to the difficulty they experienced when carrying them out. Table 3 and 4 examines the ability of adults to perform the indicated activities without the use of special equipment. The tasks chosen were reaching over your head, walking up 10 steps, standing for 2 hours, and stooping, bending, and kneeling. These were selected to provide an overview of general mobility of the population.

Interviewed subjects were asked to describe the difficulty experienced when performing certain tasks of daily living from not at all difficult to cannot do them at all. The subject population was divided into individuals under the age of 65 and those 65 or older. In adults under the age of 65, 93.37 percent had no difficulty reaching over their head, compared to 78.17
percent of those 65 or older. In adults under 65, only 2.53 percent found reaching over their heads only a little difficult and 0.64 percent could not do it at all. More adults aged 65 or older reported difficulty reaching over their heads, with 7.2 percent finding it only a little difficult and 3.17 percent who could not do it at all. A common trend among all the tasks was a large percentage of the population experiencing no difficulty and decreasing percentages with growing difficulty.

Larger percentages of older adults reported difficulty with the different tasks than the younger group. Walking up 10 steps proved to be a more difficult task with 91.58 percent of adults less than 65 reported having no difficulty and only 64.4 percent of older adults reported having no difficulty. As to standing for 2 hours, 85.75 percent of younger adults experienced no difficulty, but only 52.17 percent of older adults reported no difficulty. The most difficult task examined was stooping, bending, and kneeling, with which 82.24 percent of adults under the age of 65 experienced no difficulty and 49.53 percent of adults 65 and older experienced no difficulty.

In table 4, the information provided is the percentage of each group who exercises at least five times a week. About 34 percent of adults under the age of 65, who found each of the tasks not at all difficult exercised 5 or more times a week. A wider range of percentages are seen amongst the adults aged 65 and older, from 30.78 percent finding reaching over their head not difficult to 35.35 percent finding no difficulty in standing for 2 hours. Of adults less than 65 years of age who exercise 5 or more times a week, about 15 percent could not reach over their heads, stand for 2 hours, or stoop, bend, and kneel. Only 10.14 percent of those under 65 years of age could not walk up 10 steps. In older adults, about 14 percent who experience no difficulty in reaching over their head, standing for 2 hours or stooping, bending, and kneeling, exercise 5 or
more times a week. But even that group reports only 11.06 percent of those cannot walk up steps exercise 5 or more times a week. In general the trend for adults over the age of 65 is to be less likely than younger adults to exercise with increasing difficulty of the task. However, the percentages of those who cannot do the activity at all who exercise are similar in both age groups, except for standing for two hours. The last difficulty category listed, “do not do this activity,” is a difficult category to understand. Adults may not do the activity because they are unable, unwilling, or the opportunity never presents itself.

One task of daily living that helps to predict mobility of adults is the ability to walk one fourth of a mile. Table 5 reports the logistic regression of the difficulty individuals experience walking one fourth of a mile without any special equipment, with and without certain controls. The youngest age category is the contrast category, and control variables include demographic characteristics and types of exercise. Without controls, the younger than boomer, young boomer, and young old categories were 20 to 30 percent less likely to experience difficulty walking than the youngest cohort. The oldest old category, however, are 23 percent more likely to have difficulty walking one-quarter mile. Cohort effects were controlled for by the age in 10 years increments, but all other controls were excluded from this initial run. This walking task is 104 percent more likely to be difficult for adults for every 10 years of age. Table 5 also reports the analysis of adults experiencing difficulty walking with the addition of control variables including whether or not they exercise 5 or more times a week at a vigorous or strength training level. With the addition of control variables, the only age cohort of significance was the young old which was 32 percent less likely to have difficulty walking than the youngest cohort. Difficulty in walking one fourth of a mile increases with age. For every 10 years of age, adults are 89 percent more likely to have some difficulty walking this distance. African Americans are 42 percent
more likely to experience difficulty walking than white Americans while Hispanic Americans were 22 percent less likely. Men are 30 percent less likely than women to have difficulty in this task. Individuals who are married are 26 percent less likely to have difficulty. Those adults who have higher education are more likely not to have difficulty with this task. Individuals with at least a high school diploma were 36 percent less likely to have difficulty, at least some college were 18 percent less likely, and at least a college degree were 53 percent less likely. Moderate exercise was not used as a control because a large portion of this exercise is walking. Adults who vigorously exercise at least 5 times a week are 68 percent less likely to have difficulty walking one quarter of mile. Adults who strength train 5 or more times a week were shown to be 16 percent more likely to have difficulty walking, although this data was not significant. Strength training focuses on the gain of muscle mass and strength, but walking needs the stamina that is developed from vigorous and moderate exercise.

The body mass index (BMI) has been proven to play a role in individual health. Table 6 looks at different control variables that help to predict an individual’s body mass index. According to the standards established by the World Health Organization, adults with a body mass index of 18.5 or less are considered underweight, those with 18.5 to 25 are healthy, 25 points or higher are considered overweight, and a body mass index of 30 or higher is considered to be obese (NCHS, 2003). Table 6 reports the ordinary least squares as adjusted by SUDAAN for the continuous variable of body mass index. Two runs were completed, one focusing on demographic data and the second taking into account physical activity and difficulty walking. The run including activity controls showed that individuals in the younger than boomer cohort tend to be 1.88 BMI points greater than the youngest contrast cohort. Young boomers were 0.3 BMI points higher and old boomer 0.48 BMI points higher than youngest cohort. The oldest old
cohort was about 2.42 BMI points less than the youngest cohort. This could be explained by the fact that overweight individuals tend to have a shorter life span or that elderly adults lose weight due to muscle and bone wasting. A range was seen across the races with white Americans at the low end. African Americans tend to be 1.65 BMI points higher than whites, while Hispanic Americans were 0.76 points higher. Male bodies are built differently than females and men are about 1.09 points higher. Married individuals are only 0.17 of a point higher than single individuals. Educated adults tend to be thinner in that those with at least a high school diploma were 0.16 of a point less on the body mass index and those with a college degree were 1.05 points less. Active adults who perform some form of physical activity five or more times a week were shown to have 0.29 of a BMI point less than non-active adults. Adults with any difficulty walking were actually shown to have 2.88 BMI points less than adults with no walking issue. Possible explanations for this outcome include the fact that muscle weighs more than fat and the aging adult body loses muscle mass. A second run was completed without the physical activity and difficulty walking variables to see if these variables had any confounding effects. The result was very similar numbers in the remaining variables, proving that the inclusion of the activity variables did not confound any of the data. Age in 10 years and having earned at least a high school degree were no longer significant while marital status became significant.

Trends:

According to the data obtained in this study, it appears adults with certain characteristics are more likely to exercise five or more times a week. Those characteristics include being male, white, and having higher levels of education. Adults who have visited a chiropractor, physical therapist, or occupational therapist in the past 12 months were also found to be more likely to
exercise. These adults were probably injured in some way and exercise was used as a part of the healing process. However, health professionals cannot force their patients to continue to exercise once treatments are over. Those that choose to make exercise part of their new routine probably recognize what lead to their injury and how exercise helps them out. Adults who have trouble with different tasks of everyday living are less likely than those with no difficulty to exercise five or more times a week. Age also plays a role, in that adults over the age of 65 had more difficulty in the different tasks of daily living than younger adults. Men and adults with higher education are again in the healthier group in that they experience less difficulty in walking one quarter of a mile. Hispanic Americans, married adults, and individuals that vigorously exercise 5 or more times a week also found the task of walking a quarter mile more difficult. Strength training was not a significant predictor of difficulty experienced when walking long distances. This type of training focuses on increasing muscle mass while vigorous and moderate exercise focus more on endurance. African Americans were more likely to experience difficulty with this task and they also had a higher body mass index than white Americans. Men and married adults had a slightly larger body mass index. Individuals with at least a high school or college diploma along with those who exercise five or more times a week had a lower body mass index. The results for those who have some difficulty walking were different than predicted, in that the data showed a lowered body mass index. Individuals who have difficulty walking could be wheelchair bound or dependent on assistive devices for mobility. Lowered muscle mass could lead to the lowered body mass index.

Results from adults over the age of 65 revealed some interesting trends. The young old category (born 1926-1935) consists of adults aged 65 to 75 in the year 2001. Of these adults, 24.72 percent exercised at a moderate level five or more times a week, 9.15 percent reported
vigorous exercise five or more times a week, and 4.99 percent strength train five or more times a week. These individuals were 32 percent less likely than the youngest cohort to experience difficulty walking one quarter of a mile and have 0.78 of a body mass index point lower than that cohort. These adults were born in a different generation than the youngest adults and had different views on health. The aging adult body is losing muscle mass, flexibility, and maximum heart rate; chronic conditions are more common. The oldest old category (born pre-1926) is made up of adults over the age of 75. Only 18.36 percent of these adults reported moderate exercise five or more times a week, 4.62 percent vigorously exercise five or more times a week, and 5.26 percent reported strength training five or more times a week. These adults were 12 percent less likely to exercise than the youngest adults and 16 percent more likely to experience difficulty walking one quarter of a mile. These adults had 2.88 body mass index points less than the youngest cohort.

**Conclusion:**

**Further research is needed:**

This project examined only the data from one year of the National Health Interview Survey. The events of the year and the trends of the nation could have some influence on the outcomes of the survey. To better understand the effects of aging and exercise, it would be prudent to examine more survey years. With the inclusion of more years of data, it would be possible to explore the effects of world events and trends on American adults and to follow each cohort through the aging process.
Barriers for exercise intervention:

As adults age, their bodies become more fragile and their muscles weaken. Studies have shown that those who exercise regularly can fight the effects of aging, but the human body still changes. The data from the National Health Interview Survey shows that adults over the age of 65 who experience difficulty in common mobility tasks are less likely to exercise five or more times a week. Older adults who do strenuous exercises are more prone to a sports-related injury. To overcome the lower range of motion and strength, exercise programs should be designed for each individual with regard to their ability to complete them.

What needs to be addressed in health promotion:

The percentage of adults who exercise at least five times a week remained fairly constant over most of the aging cohorts. The oldest category, individuals aged 75 or older, had the lowest level of physical activity. This shows that this group is in greater need of education and physical awareness. This data focuses on age cohorts and not the individual ages of each group. Further research is needed to explore actual trends on a single year scale. There is a decline in physical activity with increasing age that is counteracted by the cohort effects of each group. It has been said that the boomer generation is the first to be brought up exercising so it would be interesting to see how well they continue this trend into the next several years. Overall, this study upholds the reigning theory that physical activity can improve health. Those who experience difficulty in everyday mobility tasks should find ways to remain active within their body’s capacity and not give into a sedentary life.
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Table 1. Physical Activity by Cohort

| Cohort                          | Percentage Reporting Activity |
|--------------------------------|-------------------------------|
|                                | Moderate five times per week | Vigorous five times a week | Strengthening five times a week |
| Youngest (post 1975)           | 31.40                        | 18.04                       | 9.95                       |
| Younger than Boomer (1966-1975)| 25.24                        | 15.38                       | 6.44                       |
| Young Boomer (1956-1965)       | 25.88                        | 13.02                       | 5.74                       |
| Old Boomer (1946-1955)         | 25.81                        | 13.06                       | 5.67                       |
| Oldest Boomer (1936-1945)      | 25.24                        | 10.80                       | 4.73                       |
| Older than Boomer (1926-1935)  | 24.72                        | 9.15                        | 4.99                       |
| Oldest Old (pre 1926)          | 18.36                        | 4.62                        | 5.26                       |

SOURCE: National Center for Health Statistics, 2001
Table 2. Predictors of Level of Exercise 5 to 7 Times a Week

| Any Moderate, Vigorous, or Strengthening Activity 5 to 7 Times a Week | Odds Ratio with Upper and Lower Bounds |
|---|---|
| | With Controls | Without Some Controls |
| | Ratio | Lower | Upper | Ratio | Lower | Upper |
| Intercept | 0.81 | 0.62 | 1.04 | **0.65** | 0.60 | 0.71 |
| **Independent Variables:** | | | | | | |
| Younger than Boomer (1966-1975) | 0.88 | 0.76 | 1.01 | **0.73** | 0.66 | 0.82 |
| Young Boomer (1956-1965) | **1.26** | 1.10 | 1.44 | 0.98 | 0.90 | 1.07 |
| Old Boomer (1946-1955) | **1.32** | 1.16 | 1.51 | 1.05 | 0.97 | 1.14 |
| Older than Boomer (1936-1945) | **1.24** | 1.09 | 1.42 | 0.92 | 0.83 | 1.02 |
| Young Old (1926-1935) | **1.40** | 1.18 | 1.66 | 1.01 | 0.88 | 1.15 |
| Oldest Old (pre 1926) | 0.88 | 0.74 | 1.06 | **0.65** | 0.56 | 0.74 |
| **Control Variables:** | | | | | | |
| African American | **0.72** | 0.65 | 0.79 | | | |
| Hispanic | 0.62 | 0.56 | 0.68 | | | |
| Age in 10 years | 0.77 | 0.70 | 0.85 | | | |
| Male | **1.22** | 1.15 | 1.30 | | | |
| Married | 0.99 | 0.93 | 1.05 | | | |
| At Least High School Degree | **1.28** | 1.17 | 1.40 | | | |
| At Least Some College | **1.24** | 1.14 | 1.33 | | | |
| At Least College Degree | **1.08** | 1.00 | 1.16 | | | |
| Seen chiropractor past 12 mo | **1.18** | 1.07 | 1.30 | | | |
| Seen therapist (PT, OT) past 12 mo | **1.12** | 1.01 | 1.25 | | | |

Degrees of Freedom = 18

N = 32072

Chi-Square = **774.28**

Chi-Square = 209.28

SOURCE: National Center for Health Statistics, 2001

NOTES:
1 Youngest is the contrast category.
2 Contrast category is next lower—e.g., 'oldest' to 'youngest.'

LEGEND:
Coefficients in bold are significant at the .05 level.
Underlined coefficients in bold are significant at the .01 level.
Table 3. Difficulty in Accomplishing Tasks among Age Groups

| Age                  | Reaching over head Less than 65 | 65+ | Walk up 10 steps Less than 65 | 65+ | Stand for 2 hours Less than 65 | 65+ | Stoop/bend/kneel Less than 65 | 65+ |
|----------------------|---------------------------------|-----|--------------------------------|-----|-------------------------------|-----|-----------------------------|-----|
| Not at all difficult | 93.37                           | 78.17 | 91.58                          | 64.40 | 85.75                         | 52.17 | 82.24                      | 49.53 |
| Only a little difficult | 2.53                           | 7.20  | 2.83                          | 8.71  | 4.57                          | 10.17 | 6.74                      | 13.62 |
| Somewhat difficult   | 2.13                           | 5.81  | 2.34                          | 7.34  | 3.67                          | 9.18  | 5.18                      | 12.91 |
| Very difficult       | 1.18                           | 4.08  | 1.50                          | 6.75  | 2.62                          | 8.34  | 3.48                      | 11.21 |
| Can't do at all      | 0.64                           | 3.17  | 1.31                          | 8.85  | 2.73                          | 14.57 | 2.03                      | 9.89  |
| Do not do this activity | 0.15                           | 1.56  | 0.44                          | 3.95  | 0.65                          | 5.57  | 0.34                      | 2.85  |

SOURCE: National Center for Health Statistics, 2001
Table 4. Percentage of Adults Who Exercise 5 or more Times Per Week

| Age                    | Reaching over head | Walk up 10 steps | Stand for 2 hours | Stoop/bend/knee! |
|------------------------|--------------------|------------------|-------------------|------------------|
|                        | Less than 65       | 65+              | Less than 65      | 65+              | Less than 65 | 65+ |
| Not at all difficult   | 34.12              | 30.78            | 34.82             | 35.25            | 34.70       | 35.35|
| Only a little difficult| 24.77              | 23.19            | 23.80             | 21.30            | 30.83       | 27.73|
| Somewhat difficult     | 28.23              | 20.10            | 18.97             | 17.94            | 28.97       | 25.01|
| Very difficult         | 22.10              | 15.32            | 16.86             | 11.50            | 23.47       | 19.61|
| Can't do at all        | 14.74              | 14.26            | 10.14             | 11.06            | 16.13       | 13.43|
| Do not do this activity| 12.96              | 7.06             | 13.93             | 10.74            | 24.84       | 16.25|

SOURCE: National Center for Health Statistics, 2001

LEGEND:
Percentages do not equal 100%, but are the % of each cell that exercise 5 or more times a week.
Table 5: Predictors of Any Difficulty Walking ¼ Mile

| Any Difficulty Walking ¼ Mile | Odds Ratio with Upper and Lower Bounds |
|-------------------------------|---------------------------------------|
|                               | With Controls | Without Some Controls |
|                               | Ratio | Lower | Upper | Ratio | Lower | Upper |
| Intercept                     | 0.02  | 0.02  | 0.03  | 0.01  | 0.01  | 0.01  |
| **Independent Variables:**    |        |       |       |        |       |       |
| Younger than Boomer (1966-1975) | 1.00  | 0.76  | 1.30  | 0.74  | 0.58  | 0.95  |
| Young Boomer (1956-1965)      | 0.86  | 0.72  | 1.04  | 0.81  | 0.68  | 0.97  |
| Old Boomer (1946-1955)        | 1.15  | 0.96  | 1.37  | 1.00  | 0.85  | 1.18  |
| Older than Boomer (1936-1945) | 0.89  | 0.75  | 1.04  | 0.90  | 0.77  | 1.06  |
| Young Old (1926-1935)         | 0.68  | 0.56  | 0.81  | 0.70  | 0.59  | 0.83  |
| Oldest Old (pre 1926)         | 1.16  | 0.96  | 1.40  | 1.23  | 1.02  | 1.48  |
| **Control Variables:**        |        |       |       |        |       |       |
| African American              | 1.42  | 1.27  | 1.59  |        |       |       |
| Hispanic                      | 0.78  | 0.67  | 0.92  |        |       |       |
| Age in 10 years               | 1.89  | 1.66  | 2.15  | 2.04  | 1.80  | 2.30  |
| Male                          | 0.70  | 0.65  | 0.76  |        |       |       |
| Married                       | 0.74  | 0.69  | 0.80  |        |       |       |
| At Least High School Degree   | 0.64  | 0.58  | 0.71  |        |       |       |
| At Least Some College         | 0.82  | 0.75  | 0.91  |        |       |       |
| At Least College Degree       | 0.47  | 0.42  | 0.53  |        |       |       |
| Vigorous Exercise 5+ times a week | 0.32  | 0.27  | 0.38  |        |       |       |
| Strength Training 5+ times a week | 1.16  | 0.95  | 1.41  |        |       |       |

Degrees of Freedom = 16
N = 32289
Chi-Square = 5836.40

SOURCE: National Center for Health Statistics, 2001

NOTES:
1 Youngest is the contrast category.
2 Contrast category is next lower—e.g., ‘oldest’ to ‘youngest.’

LEGEND:
Coefficients in bold are significant at the .05 level.
Underlined coefficients in bold are significant at the .01 level.
Table 6. Predictors of Body Mass Index

| Body Mass Index | With Activity Controls | Without Activity Controls |
|-----------------|------------------------|---------------------------|
|                 | Beta Coeff. | T-Test  | Beta Coeff. | T-Test  |
| Intercept       | 30.00       | 72.86   | 23.89       | 81.90   |
| **Independent Variables:** | | | | |
| Younger than Boomer (1966-1975) | 1.88 | 11.72 | 1.79 | 11.34 |
| Young Boomer (1956-1965) | 0.30 | 1.87 | 0.11 | 0.67 |
| Old Boomer (1946-1955) | 0.41 | 2.43 | 0.33 | 1.98 |
| Older than Boomer (1936-1945) | -0.24 | -1.36 | -0.27 | -1.52 |
| Young Old (1926-1935) | -0.79 | -3.90 | -0.97 | -4.71 |
| Oldest Old (pre 1926) | -2.42 | -12.99 | -2.12 | -11.08 |
| **Control Variables:** | | | | |
| African American | 1.65 | 12.67 | 1.79 | 13.37 |
| Hispanic | 0.76 | 6.22 | 0.72 | 5.93 |
| Age in 10 years | 0.01 | 0.05 | 0.31 | 2.63 |
| Male | 1.09 | 15.33 | 0.95 | 13.15 |
| Married | 0.17 | 2.16 | 0.06 | 0.74 |
| At Least High School Degree | -0.16 | -1.45 | -0.38 | -3.60 |
| At Least Some College | 0.00 | 0.00 | -0.07 | -0.73 |
| At Least College Degree | -1.05 | -11.33 | -1.27 | -13.60 |
| Any Physical Activity 5+ Times a Week | -0.29 | -3.85 | |
| Any Difficulty Walking 1/4 of a Mile | -2.88 | -22.21 | |
| **Denominator Degrees of Freedom =** | 339 | 339 |
| **N =** | 31070 | 31557 |
| **Clusters =** | 678 | 678 |

SOURCE: National Center for Health Statistics, 2001

NOTES:
1 Youngest is the contrast category.
2 Contrast category is next lower—e.g., 'oldest' to 'youngest.'

LEGEND:
Coefficients in bold are significant at the 1.96 level of the T-test.
**APPENDIX:** Sample Questions and Answers from the National Health Interview Survey

**2001 NATIONAL HEALTH INTERVIEW SURVEY**
**SAMPLE ADULT PERSON SECTION - PUBLIC USE**

**33,326 RECORDS**

| Variable Name | Question | Section modified 10/29/02 |
|---------------|----------|---------------------------|
| SEX           | (If not apparent) Is [Person] male or female? | |
| HHC.110       | ASTATFLG = 1 and AGE = 18+ | |
|               | Sample adults 18+ | |
|               | Sex | |
|               | 14,490 1 | Male | |
|               | 18,836 2 | Female | |

Sources: None
Recodes: None
Keywords: None
Notes: None

**RACERP_I**

Recode of full detail race groups

| HHC Recode | ASTATFLG = 1 and AGE = 18+ | |
|-------------|---------------------------| |
| Sample adults 18+ | | |
| 30-31 | OMB groups w/multiple race | |
| 25,827 01 | White only | |
| 4,620 02 | Black/African American only | |
| 213 03 | AIAN* only | |
| 907 04 | Asian only | |
| 1,341 05 | Other race only | |
| 418 06 | Multiple race | |

Sources: HHC.200
Recodes: None
Keywords: race; new OMB race standards
Notes: *AIAN is American Indian/Alaska Native. This recode contains detail for 4 of the 5 OMB race groups, "Other" race, and a single multiple race category; detailed subgroups have been collapsed into a single category. Native Hawaiian/Other Pacific Islander (NHOPI) is included in "Other" for confidentiality reasons. This recode does not include the information provided in HHC.220 for multiple race mentions (the "primary" race). Persons with multiple Asian or AIAN race mentions are coded as "Asian" or "AIAN", respectively on this variable.
What is the HIGHEST level of school {person} {have/has} completed or the highest degree {person} {have/has} received? Please tell me the number from the card.

Enter highest level of school:

| Level | Description                                      | Count |
|-------|--------------------------------------------------|-------|
| 00    | Never attended/ kindergarten only                | 202   |
| 01-11 | Grades 1 - 11                                    | 5,754 |
| 12    | 12th grade, no diploma                           | 765   |
| 13    | HIGH SCHOOL GRADUATE                             | 8,606 |
| 14    | GED or equivalent                                 | 824   |
| 15    | Some college, no degree                          | 6,436 |
| 16    | AA degree: technical or vocational               | 1,980 |
| 17    | AA degree: academic program                       | 999   |
| 18    | Bachelor's degree (BA, AB, BS, BBA)              | 4,917 |
| 19    | Master's degree (MA, MS, MEng, Med, MBA)        | 1,757 |
| 20    | Professional degree (MD, DDS, DVM, JD)          | 443   |
| 21    | Doctoral degree (PhD, EdD)                       | 304   |
| 96    | Child under 5 years old                          | 0     |
| 97    | Refused                                          | 172   |
| 98    | Not Ascertained                                  | 0     |
| 99    | Don't know                                       | 167   |

Sources: None
Recodes: None
Keywords: education; level of education completed
Notes: A consistency check between age and years of education was carried out for respondents aged 5-17. Unlikely education values (e.g., a 17 year-old with a college degree) were reclassified as "Not ascertained."
FLWALK  By yourself, and without using any special equipment, how difficult is it for you to ... Walk a quarter of a mile - about 3 city blocks?

ASTATFLG = 1 and AGE >= 18
Sample adults 18+

263  How dif walk 1/4 mile w/o spec equip

| Code | Frequency | Response |
|------|-----------|----------|
| 27,171 | 0 | Not at all difficult |
| 1,569 | 1 | Only a little difficult |
| 1,315 | 2 | Somewhat difficult |
| 1,100 | 3 | Very difficult |
| 829 | 4 | Can't do at all |
| 721 | 6 | Do not do this activity |
| 49 | 7 | Refused |
| 6 | 8 | Not ascertained |
| 46 | 9 | Don't know |

Sources: None
Recodes: FLA1AR
Keywords: difficulty walking; special equipment
Notes: Response category 6, "Do not do this activity," was added to the question in 2000 survey.
See Survey Description Document for more information.

VIGNO  How often do you do VIGOROUS activities for AT LEAST 10 MINUTES that cause HEAVY sweating or LARGE increases in breathing or heart rate?

ASTATFLG = 1 and AGE = 18+
Sample adults 18+

624-626  Freq vigorous activity: # of units

| Code | Frequency | Response |
|------|-----------|----------|
| 19,043 | 000 | Never |
| 12,784 | 001-995 | 1-995 times per |
| 981 | 996 | Unable to do this type activity |
| 160 | 997 | Refused |
| 122 | 998 | Not ascertained |
| 236 | 999 | Don't know |

Sources: None
Recodes: VIGFREQw
Keywords: physical activity; exercise; vigorous activity
Notes: Leisure time activities only.
VIGFREQ  How often do you do VIGOROUS activities for AT LEAST 10 MINUTES that cause HEAVY sweating or LARGE increases in breathing or heart rate?

AHSB.090

ASTATFLG = 1 and AGE = 18+

Sample adults 18+

627  Freq vigorous activity: Time units

| Days  | Frequency |
|-------|-----------|
| Never | 19,043    |
| 1 Day | 2,465     |
| 1 Week| 9,135     |
| 1 Month| 986      |
| 1 Year| 198       |
| Unable to do this activity | 981  |
| Refused | 160     |
| Not ascertained | 122     |
| Don't know | 236     |

Sources: None

Recodes: VIGFREQ

Keywords: physical activity; exercise; vigorous activity

Notes: Leisure time activities only.

AHCSYR4

DURING THE PAST 12 MONTHS, that is since [12 month ref. date], have you seen or talked to any of the following health care providers about your own health? ..... A chiropractor

AAU.141

ASTATFLG = 1 and AGE = 18+

 Sample Adults 18+

749  Seen/talk to a chiropractor, past 12 mo

| Yes | 2,661 |
| No | 30,364 |
| Refused | 129 |
| Not ascertained | 126 |
| Don't know | 46 |

Sources: None

Recodes: None

Keywords: access; source; dr. visit/contact; medical advice; chiropractor

Notes: None