Adherence to Physical Activity Recommendations in Older Adults: An Israeli National Survey

Yael Netz, Rebecca Goldsmith, Tal Shimony, Yosefa Ben-Moshe, and Aviva Zeev

The trend of extended life expectancy along with a sedentary lifestyle is typical in Western cultures. **Objective:** To explore adherence to physical activity recommendations in older adults in Israel. **Methods:** A random sample of 1,536 Jews and 316 Arabs age 65+ were interviewed and divided into sufficiently active, insufficiently active, and inactive groups based on official guidelines. **Results:** Only 36.4% of the Jewish sector and 19.6% of the Arab sector are sufficiently active. Men are more active than women, the secular are more active than the religious among both Jews and Arabs, and more years of education, a higher income, and fewer diseases and medications are related to higher levels of physical activity. **Discussion:** To slow down biological age decline with physical activity, intervention programs specifically tailored for culturally diverse groups are suggested—for example, recruiting prominent religious leaders to promote physical activity in religious populations.

**Keywords:** sufficient physical activity, physical activity and demographic variables, extended life expectancy and sedentary life, old age

The benefits of habitual physical activity in old age are extensive and well-documented (American College of Sport Medicine [ACSM], 1998, 2009; Nelson et al., 2007; U.S. Department of Health and Human Services [USDHHS], 2008). For example, a study assessing the relationship between physical activity and mortality among older adults found that for every 287 kcal/day of energy expenditure as a result of physical activity in old age, there is approximately a 30% lower risk of mortality (Manini et al., 2006). Among women, 2.5 hr/week of walking at a medium pace of about 4 km/hr resulted in a significant reduction in the risk of cardiovascular disease (Manson et al., 2002), and higher doses of exercise were associated with greater improvements in the mental and physical aspects of quality of life (Martin, Church, Thompson, Earnest, & Blair, 2009). A recent meta-analysis clearly showed
that cardiorespiratory fitness is a quantitative predictor of all-cause mortality and cardiovascular events in healthy men and women (Kodama et al., 2009).

The recommended dose of physical activity for preserving health and functioning is also well documented. Older adults are advised to perform moderate-intensity activity for at least 150 min, 75 min of vigorous-intensity aerobic activity, or an equivalent mix of moderate- and vigorous-intensity aerobic activity per week (ACSM, 2009; Nelson et al., 2007; USDHHS, 2008). The intensity of the activity is explained in common terms by the ACSM guidelines. According to these guidelines, moderate intensity means a medium level of effort that makes a person breathe harder than when at rest, and vigorous intensity means a high level of effort that makes a person “puff and pant.” On a 10-point scale, where sitting is 0 and all-out effort is 10, moderate-intensity activity is a 5 or 6 and produces noticeable increases in heart rate and breathing. On the same scale, vigorous-intensity activity is a 7 or 8 and produces large increases in heart rate and breathing (ACSM, 2009). For example, given the range of fitness levels in older adults, for some a moderate-intensity walk is a slow walk and for others it is a brisk walk (Nelson et al., 2007). Any modality that does not impose excessive orthopedic stress is recommended, and the duration of the activity can be broken into small chunks of 10 min or more at a time (ACSM, 2009). The guidelines also note that additional benefits occur as the amount of physical activity increases through higher intensity, greater frequency, or longer duration (ACSM, 2009; USDHHS, 2008).

Despite the evidence regarding the value of physical activity and the clear guidelines for this activity, statistics continue to show that most older adults do not engage regularly and sufficiently in moderately intense physical activity. For example, in the United Kingdom only 10% of older adults (65+) are sufficiently active (Taylor et al., 2004), and in the United States, 21.8% (Kruger, Carlson, & Buchner, 2007). A higher rate of sufficiently active older adults is observed in Australia, 55% (Brownie, 2005), but even so, almost half are insufficiently active.

In this study we aimed to explore adherence to physical activity recommendations in older adults in Israel. Together with Japan, Australia, and Sweden, Israel has the highest life expectancy in the world for males at birth (79 years), and life expectancy of females at birth is 82 years, which is 2 years younger than that of Australia and 4 years younger than that of Japan, which has the highest in the world (World Health Organization [WHO], 2008). Based on WHO statistics, life expectancy in Israel at age 65–69 is 18.2 for men and 20.2 for women, which is lower than 18.7 for men and 21.8 for women in Australia but higher than 17.3 for men and 20.0 for women in the United States and 16.9 for men and 19.7 for women in the UK (Mashav Planning for the Elderly, 2008). It is worth mentioning that in the last few years surveys report “life expectancy in good health” rather than actual life expectancy (WHO, 2008). The results of an 18-year longitudinal cohort study support the hypothesis that physical activity not only improves survival but also delays functional loss (Stessman, Hammerman-Rozenberg, Cohen, Ein-Mor, & Jacobs, 2009), thus improving health and quality of life.

According to the Israel Central Bureau of Statistics (CBS) population projections (Israel CBS, 2008), from 2007 to 2030 the rate of increase of the elderly population is expected to be 2.5 times that of the general population. Arabs (Muslims, Christian, and Druze) make up 7% of the older population in Israel. This percentage is expected to rise to 12% by 2030. The Arab population is young
relative to the Jewish population, and the proportion of old people stands at 3.5%, compared with 11.4% in the Jewish population (Mashav Planning for the Elderly, 2008). Life expectancy at birth in the Arab population is 75.1 for men and 78.7 for women, and at age 65, 15.8 and 17.4, respectively (Israel CBS, 2008).

Although some data have been published on physical activity in older adults in Israel, they have not been assessed in regard to the amount of activity recommended for preserving health and functioning. Based on the CBS data, in 2003–04, 41.3% of Israelis age 65 and over were involved in physical activity at least three times a week for 20 min or more (Israel CBS, 2008). Although this information indicates that 41.3% of Israelis age 65 and over are not sedentary, it does not clarify whether they meet recommendations. In a survey conducted by the Israel Center for Disease Control in 2002–03 in the general population in Israel, it was found that among people age 65 and over, 41.8% of Jews and 15.5% of Arabs were doing aerobic activity every day or nearly every day for a minimum of 20 min; 12.5% and 5.4%, respectively, once or twice a week; and 45.8% and 79%, respectively, less than once a week (Baron-Epel, Haviv, Garty, Tamir, & Green, 2005). Although this survey is more informative than the one conducted by the CBS, it does not indicate whether individuals are sufficiently active. Based on this survey, people can belong to the highly active group but still not meet the recommendation (i.e., even 20 min of moderate-intensity activity seven times a week does not add up to the recommended 150 min). A recently published longitudinal study of a birth cohort of Jerusalem residents reported that 53.4% of the participants at age 70, 76.9% at age 78, and 64% at age 85 were physically active (Stessman et al., 2009). However, in addition to including only a single birth cohort of a solely Jewish population, physical activity in that study was defined as any activity that accumulates to about 4 hr/week. This does not necessarily mean planned habitual physical activity but any routine activity of daily living of light intensity, such as walking around the home. This does not meet the official guidelines, which emphasize that the recommended amount of activity be in addition to routine light-intensity activities of daily living such as casual walking (Nelson et al., 2007)

In addition to assessing the rate of adherence to recommended guidelines of physical activity in older adults in Israel, our aim was to explore the extent to which the level of participation in physical activity in old age is related to demographic and health variables. In particular, we were interested in gender and ethnic differences in the rate of adherence to physical activity recommendations. This information would help in creating intervention programs specifically oriented to the needs of culturally diverse older populations.

Our study was conducted in the following manner:

• The data collected were assessed in reference to the recommended guidelines for physical activity as described herein. Based on these guidelines, three levels were created: sufficiently active, insufficiently active, and inactive.

• The activity groups were described in terms of demographic variables and health parameters for the Jewish and Arab sectors separately.

• Types of physical activity (walking, body shaping, etc.) were described for both the sufficiently and insufficiently active groups.
Method

Data collection for the current study (the Mabat Zahav survey) was carried out over an 18-month period, between July 2005 and December 2006, by the Israel Center for Disease Control together with the Department of Nutrition, with the cooperation of the Israel Hypertension Society, the Geriatric and Dental Health divisions of the Ministry of Health, Maccabi Health Services, Clalit Health Services, and JDC-Eshel. The study was approved by the ethics committee of the Chaim Sheba Medical Center and the Ministry of Health.

Population

The target population included Israeli citizens age 65 and over, living in the community (their own homes or sheltered housing) and having resided in the country for at least 1 year. The sampling framework was provided by the two major health funds, Clalit Health Services and Maccabi Health Services, which represent 86.3% of all the elderly citizens in Israel. Oversampling was carried out in the Arab population to ensure a sample large enough to carry out statistical analyses and comparisons with the Jewish sector. For each sector two samples were drawn, which included a total of 8,500 participants from the Jewish sector and 3,350 from the Arab sector.

Inclusion Criterion

To be in the study, one had to be an older adult living in an urban settlement numbering 20,000 residents or more. The survey was carried out in four languages (Hebrew, Arabic, Russian, and English) by interviewers fluent in their specific language.

Exclusion Criteria

The following individuals were excluded from the study:

- Older adults not living in their own homes in the community, for the following reasons: being out of the country for 6 months or more, hospitalization for more than 6 months, hospitalization in a psychiatric institution, and hospitalization in a long-term-care institution.

- Older adults with significant cognitive reduction. Cognitive assessment was carried out using the Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975). Scores were adjusted for education and age using Crum tables (Crum, Anthony, Besset, & Folstein, 1993). Those with adjusted scores of less than 17, indicating significant cognitive impairment, were excluded from the analysis because of doubt as to the reliability of their answers to questions.

- Assuming that functional limitations may cause difficulties in performing physical activity, elderly people with significant functional limitations were also excluded from the current study. Significant functional limitations were defined as the inability to perform one or more of the following activities of daily living: dress, shower/bathe, sit down in and get up from a chair, eat, and go to the bathroom (Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963).
Recruitment of Interviewees

The research staff sent out preliminary letters (by mail) with a description of the survey and a request to participate. Prospective participants were informed that telephone contact would be made with them in the near future. One or two weeks after the letter was mailed, interviewees were contacted by a telephone coordinator from the Israel Center for Disease Control and asked whether they would agree to participate in the survey. An interview appointment was set for those who agreed. Telephone contact was considered to have failed if, after eight attempts, contact could not be made (number disconnected, no answer, busy signal, recorded message) or if it was discovered that the person was temporarily overseas, had left the country for at least 1 year, was living in an institution, was hospitalized (long-term), or had died.

During the data collection, 352 Jews and 78 Arabs were excluded (deceased, hospitalized, institutionalized, or left Israel), 1,439 Jews and 746 Arabs were unreachable, 1,856 Jews and 239 Arabs refused to participate (“refusers”), and 1,530 Jews and 259 Arabs subsequently withdrew (cancelled meetings, did not sign consent form, etc.). At that point, there were 1,536 Jewish and 316 Arab interviewees, and a decision was made to stop the data collection, leaving 1,787 Jews and 1,712 Arabs who were not in communication with the research staff (“remainders”).

To characterize those who did not participate, two telephone surveys were conducted in a random sample of 146 Jewish and 41 Arab refusers and 187 Jewish and 181 Arab remainders. Generally, the refusers and remainders in both the Jewish and Arab sectors were less educated and reported more functional limitations. For example, 74% of the refusers in the Jewish sector reported functional independence, compared with 86.4% of the interviewees in this sector.

Of those who were interviewed (1,536 Jews and 316 Arabs), 189 were excluded based on their cognitive functioning (Mini-Mental State Examination < 17; n = 46) or physical functioning (unable to perform one or more of the basic daily activities based on Katz et al. [1963]; n = 136) or for missing data (n = 7), leaving a total of 1,663 participants. This group was compared with the general 65-and-over population in Israel as reported by the CBS (Israel CBS, 2008). Although the distributions of age and gender were similar to those of the general population, participants in the final analysis, in both the Jewish and Arab sectors, were more educated than the general population, and more Arab participants were secular than Arabs in the general population.

Questionnaire and Anthropometric Measurements

A face-to-face personal interview was conducted in the interviewees’ homes using a structured questionnaire. The questionnaire was written in Hebrew and translated into Russian, Arabic, and English. Back-translation was carried out to verify accuracy. Education was coded as number of school years, and level of religiosity as religious or secular. Income was given in Israeli currency (new Israeli shekels). Continent of origin (for Jews only) was coded as born in Israel, in Asia/Africa, or in Europe/USA. Medications were coded using the Anatomical Therapeutical and Chemical system developed by the WHO (www.whocc.no/atcddd/), and number of medications (prescriptions) was recorded. Self-rated health was described at four levels, from 1 = very good to 4 = bad. The chronic illness index included
eight illnesses or conditions: heart attack, other heart disease, stroke, renal disease, asthma, diabetes, hypercholesterolemia, and osteoporosis. These illnesses were categorized into three levels: no illnesses, one to three illnesses, and four or more illnesses. Variations in functioning level (among those who did not have serious limitations in activities of daily living and thus were not excluded from the study) were calculated as the sum of difficulties in preparing meals, shopping, walking outside the house, and going up or down stairs. Body-mass index (BMI) was calculated based on actual measurements of height and weight. BMI of 25–29.9 kg/m² is considered overweight, and 30 kg/m² or more is considered obese (U.S. Preventive Services Task Force, 2003).

**Assessment of Physical Activity**

The physical activity questionnaire was based on a standard questionnaire previously used in an adult (age 25–64) population study by the Israel Center for Disease Control together with Food and Nutrition Services. For the purposes of the current study, it was tested on older adults in two stages: A pretest form was administered to 17 older adults age 67–89 and then revised based on the interviewers’ comments. In the second stage it was administered twice to a random sample of 40 older adults age 65–91. Cohen’s kappa interobserver test–retest indicated a reliability of .7.

Participants were asked, in two sets of questions, about their physical activity habits during their leisure time. One set of questions referred to intensive activity (energetic physical activity that “makes you breathe harder or puff and pant”), and the other, to any type physical activity (moderate activity) that lasts at least 10 min. Participants reported the frequency, duration (months or years), and average length per session of their activities. After the two general questions referring to intensive and any other type of activities (moderate activities), they were asked to report the time they devoted to specific activities (walking outdoors or on a treadmill; jogging; swimming; bike riding or stationary cycling; light exercise such as yoga, Feldenkrais, Alexander’s method, light gymnastics; body shaping and strength training in a fitness room; any other activity). Because the recommended amount of aerobic activity is in addition to routine light-intensity activities of daily living (self-care, cooking, shopping, casual walking) or moderate-intensity activities lasting less than 10 min (e.g., walking around home or office, walking from the parking lot; Nelson et al., 2007), household, transport, or other routine activities of daily living of light intensity were not specified. On the other hand, if a person walks routinely at least 10 min to see his or her family or to a community center, he or she was able to specify this under “any type” (moderate) activity. Based on recommendations from the ACSM and the American Heart Association (Nelson et al., 2007), from the ACSM (2009), and from the USDHHS (2008) regarding aerobic exercise, participants were divided into groups reflecting three levels of exercise:

- **Group 1:** Sufficiently active—those who were involved in moderate physical activity for at least 150 min/week, intensive activity for at least 75 min/week, or a combination of the two.
- **Group 2:** Insufficiently active—those who were involved in physical activity but a lesser amount than Group 1.
- **Group 3:** Inactive—Those who reported no activity or activity less than once a week.
Data Analysis

Three-way ANOVAs with activity (sufficiently active, insufficiently active, inactive), gender, and sector (Jews vs. Arabs) as independent variables were conducted for each of the following variables: age, education, income, BMI, functioning level, chronic illness index, number of medications, and self-rated health. Post hoc tests (Bonferroni) were carried out to detect paired groups differences. Chi-square tests were used to assess differences between genders, sectors, continent of origin, and religious versus secular on the activity levels.

Results

Table 1 presents the distribution of participants in the three activity groups and their relevant demographic and health information. Tables 2 and 3 present the same information for men and women and for the Jewish and Arab sectors, respectively. Results of the ANOVAs are presented as follows: The main effect of activity level is presented in Table 1, level of activity by gender interaction and gender main effect in Table 2, and sector by activity level and sector main effect in Table 3. The analyses were conducted according to the availability of data. For example, several participants did not indicate whether they were religious or secular, so the number of secular and religious participants across the three activity groups together is 1,657 rather than 1,663 (Table 1).

Generally, based on the sample used in the current study, 33.4% of older adults in Israel are sufficiently active, 39.4% are totally inactive, and 27.2% are active but insufficiently (Table 1). Men were significantly more active than women. Among the men, 40.3% were sufficiently active and 34.5% were inactive. The opposite trend was observed in women; 27% were sufficiently active and 44% were inactive (Table 1).

No significant age differences were found between the activity groups (Table 1), but women were younger than men in all three activity levels (Table 2). Jews were older than Arabs—the differences were significant (.05) in the sufficiently and insufficiently active groups (Table 3).

The sufficiently active individuals were the most educated group, followed by the insufficiently active and the inactive (Table 1). Differences were noted between the sufficiently and the insufficiently active (.008) and between the sufficiently active and the inactive (p < .001). Women were less educated than men (Table 2), specifically in the inactive and the insufficiently active groups (p < .05). Arabs were significantly less educated than Jews (Table 3) in all levels of activity (p < .001).

Significant differences were demonstrated between the activity groups on income (Table 1), specifically between the sufficiently active and the inactive (p = .037) and between the insufficiently active and the inactive (p = .016). Men’s income was higher than women’s (Table 2)—differences were significant in the sufficiently active and the inactive (p < .05). Jews’ income was higher than that of Arabs (Table 3) in all groups—especially in the sufficiently active and the inactive (p < .001), but also in the insufficiently active (p < .05).

Jews were significantly more active than Arabs. One third (33.3%) of the Jews were inactive, and twice as many (66.7%) of the Arab participants were inactive. The opposite trend appeared in the sufficiently active group—36.4% of the Jews
<table>
<thead>
<tr>
<th></th>
<th>Sufficiently active</th>
<th>Insufficiently active</th>
<th>Inactive</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n (%)</strong></td>
<td>555 (33.4)</td>
<td>452 (27.2)</td>
<td>656 (39.4)</td>
<td></td>
</tr>
<tr>
<td><strong>Men/women (%)</strong></td>
<td>322/233 (40.3/27.0)</td>
<td>201/251 (25.2/29.1)</td>
<td>276/380 (34.5/44.0)</td>
<td>(\chi^2(2) = 33.8, p &lt; .001)</td>
</tr>
<tr>
<td><strong>Age (SD)</strong></td>
<td>73.83 (5.82)</td>
<td>74.56 (5.81)</td>
<td>74.55 (6.38)</td>
<td></td>
</tr>
<tr>
<td><strong>Years of education (SD)</strong></td>
<td>12.52 (4.50)</td>
<td>11.36 (4.74)</td>
<td>8.89 (5.36)</td>
<td>(F(2, 1,651) = 2.63, p = .072)</td>
</tr>
<tr>
<td><strong>Income in shekels (SD)</strong></td>
<td>7,101 (3,895)</td>
<td>6,541 (3,858)</td>
<td>4,830 (3,388)</td>
<td>(F(2, 1,292) = 6.20, p &lt; .002)</td>
</tr>
<tr>
<td><strong>Jews/Arabs (%)</strong></td>
<td>503/52 (36.4/19.6)</td>
<td>424/28 (30.2/13.7)</td>
<td>457/199 (33.3/66.7)</td>
<td>(\chi^2(2) = 144.44, p &lt; .001)</td>
</tr>
<tr>
<td><strong>Continent origin (Jews; %)</strong></td>
<td>Isr 36, AsAf 31, EuUs 39</td>
<td>Isr 35, AsAf 32, EuUS 29</td>
<td>Isr 29, AsAf 37, EuUs, 32</td>
<td>(\chi^2(4) = 10.04, p = .04)</td>
</tr>
<tr>
<td><strong>Secular/religious (%)</strong></td>
<td>322/233 (40.0/27.3)</td>
<td>213/236 (26.5/27.7)</td>
<td>270/383 (33.5/45.0)</td>
<td>(\chi^2(2) = 33.70, p &lt; .001)</td>
</tr>
<tr>
<td><strong>Body-mass index (SD)</strong></td>
<td>27.88 (4.09)</td>
<td>28.61 (4.23)</td>
<td>29.61 (5.14)</td>
<td>(F(2, 1,497) = 13.16, p &lt; .001)</td>
</tr>
<tr>
<td><strong>Functioning level (SD)</strong></td>
<td>0.21 (0.58)</td>
<td>0.49 (0.90)</td>
<td>1.1 (1.23)</td>
<td>(F(2, 1,651) = 29.77, p &lt; .001)</td>
</tr>
<tr>
<td><strong>Chronic illness index (SD)</strong></td>
<td>2.08 (0.28)</td>
<td>2.13 (0.34)</td>
<td>2.17 (0.38)</td>
<td>(F(2, 1,393) = 2.11, p = N.S.)</td>
</tr>
<tr>
<td><strong>Number of medications (SD)</strong></td>
<td>4.81 (2.96)</td>
<td>5.32 (3.13)</td>
<td>5.64 (3.43)</td>
<td>(F(2, 1,651) = 2.14, p = N.S.)</td>
</tr>
<tr>
<td><strong>Self-rated health (SD)</strong></td>
<td>2.12 (0.71)</td>
<td>2.38 (0.72)</td>
<td>2.63 (0.76)</td>
<td>(F(2, 1,651) = 15.47, p &lt; .001)</td>
</tr>
</tbody>
</table>

Note. Isr = Israel, AsAf = Asia and Africa, EuUs = Europe and the United States. Analyses are based on data available.
Table 2  Demographics and Statistics for Men and Women

<table>
<thead>
<tr>
<th></th>
<th>Sufficiently Active</th>
<th>Insufficiently Active</th>
<th>Inactive</th>
<th>Gender × Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>Age (SD)</td>
<td>73.98 (5.96)</td>
<td>73.61 (5.62)</td>
<td>75.55 (6.33)</td>
<td>73.76 (5.23)</td>
</tr>
<tr>
<td>Years of education (SD)</td>
<td>12.67 (4.82)</td>
<td>12.30 (4.02)</td>
<td>12.10 (4.40)</td>
<td>10.76 (4.91)</td>
</tr>
<tr>
<td>Income in shekels (SD)</td>
<td>7,677 (4,015)</td>
<td>6,318 (3,591)</td>
<td>7,401 (3,918)</td>
<td>5,723 (3,627)</td>
</tr>
<tr>
<td>Jews/Arabs (%)</td>
<td>278/44 (42/31)</td>
<td>225/8 (31/6)</td>
<td>185/16 (28/11)</td>
<td>239/12 (33/9)</td>
</tr>
<tr>
<td>Continent origin (Jews) (%)</td>
<td>Isr 31, AsAf 24</td>
<td>Isr 34, AsAf 28</td>
<td>Isr 36, AsAf 36</td>
<td>Isr 26, AsAf 33</td>
</tr>
<tr>
<td>Secular/religious (%)</td>
<td>177/145 (46/35)</td>
<td>145/88 (34/20)</td>
<td>96/103 (25/25)</td>
<td>117/133 (28/30)</td>
</tr>
<tr>
<td>Body-mass index (SD)</td>
<td>27.53 (3.78)</td>
<td>28.36 (4.45)</td>
<td>28.23 (3.91)</td>
<td>28.90 (4.44)</td>
</tr>
<tr>
<td>Functioning level (SD)</td>
<td>0.14 (0.44)</td>
<td>0.30 (0.73)</td>
<td>0.46 (0.85)</td>
<td>0.51 (0.94)</td>
</tr>
<tr>
<td>Chronic illness index (SD)</td>
<td>2.10 (0.29)</td>
<td>2.07 (0.26)</td>
<td>2.13 (0.34)</td>
<td>2.13 (0.34)</td>
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<tr>
<td>Number of medications (SD)</td>
<td>4.55 (2.91)</td>
<td>5.16 (2.99)</td>
<td>5.32 (3.36)</td>
<td>5.32 (2.95)</td>
</tr>
<tr>
<td>Self-rated health (SD)</td>
<td>2.06 (0.70)</td>
<td>2.17 (0.72)</td>
<td>2.31 (0.74)</td>
<td>2.44 (0.70)</td>
</tr>
</tbody>
</table>

Note. Isr = Israel, AsAf = Asia and Africa, EuUs = Europe and the United States. Analyses are based on data available.

*Gender main effect: age, education, income, functioning level, self-rated health.
### Table 3  Demographics and Statistics for Jews and Arabs

<table>
<thead>
<tr>
<th></th>
<th>Sufficiently Active</th>
<th>Insufficiently Active</th>
<th>Inactive</th>
<th>Sector × Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jews (SD)</td>
<td>Arabs (SD)</td>
<td>Jews (SD)</td>
<td>Arabs (SD)</td>
</tr>
<tr>
<td>Age (SD)</td>
<td>74.13 (5.91)</td>
<td>70.92 (4.24)</td>
<td>74.62 (5.83)</td>
<td>73.61 (5.62)</td>
</tr>
<tr>
<td>Years of education</td>
<td>12.96 (4.23)</td>
<td>8.23 (4.72)</td>
<td>11.68 (4.54)</td>
<td>6.46 (5.04)</td>
</tr>
<tr>
<td>Income in shekels</td>
<td>7,436 (3,907)</td>
<td>3,976 (1,894)</td>
<td>6,622 (3,891)</td>
<td>5,041 (2,878)</td>
</tr>
<tr>
<td>Secular/religious (%)</td>
<td>310/193 (41/31)</td>
<td>12/40 (24/18)</td>
<td>207/214 (27/34)</td>
<td>6/22 (12/10)</td>
</tr>
<tr>
<td>Body-mass index (SD)</td>
<td>27.92 (4.07)</td>
<td>27.42 (4.33)</td>
<td>28.70 (4.24)</td>
<td>27.11 (3.81)</td>
</tr>
<tr>
<td>Functioning level</td>
<td>0.21 (0.52)</td>
<td>0.21 (0.61)</td>
<td>0.48 (0.90)</td>
<td>0.61 (0.96)</td>
</tr>
<tr>
<td>Chronic illness index (SD)</td>
<td>2.08 (0.28)</td>
<td>2.09 (0.28)</td>
<td>2.13 (0.34)</td>
<td>2.11 (0.32)</td>
</tr>
<tr>
<td>Number of medications</td>
<td>4.90 (2.98)</td>
<td>3.88 (2.66)</td>
<td>5.31 (3.11)</td>
<td>5.43 (3.54)</td>
</tr>
<tr>
<td>Self-rated health</td>
<td>2.13 (0.71)</td>
<td>2.02 (0.68)</td>
<td>2.39 (0.72)</td>
<td>2.24 (0.76)</td>
</tr>
</tbody>
</table>

*Note. Analyses are based on data available.

*Sector main effect: age, education, income, functioning level, self-rated health.
were sufficiently active, compared with only 19.6% in the Arabs (Table 1). This was demonstrated in both genders, but especially in women. Among the Arab men, 31% were sufficiently active, compared with 42% of Jews, and only 6% of Arab women were sufficiently active, compared with 31% of Jewish women (Table 2).

A larger percentage of Jews born in Israel, Europe, and the United States was relatively more sufficiently active (36% and 39% respectively) than inactive (29% and 32%; Table 1). No gender differences were found in the activity groups (Table 2).

As demonstrated in Table 1, religious people were less active than secular people. This trend appeared in both genders (Table 2) and in both sectors (Table 3). The rate of religiousness was significantly higher in the inactive Arab individuals than in the inactive Jews, $\chi^2(1) = 73.86, p < .001$.

Mean BMIs of the three activity groups and of both genders and sectors were higher than 25, which is considered overweight according to the U.S. Preventive Services Task Force (2003). Significant differences were found among the three activity groups, with the highest scores in the inactive and the lowest in the sufficiently active (Table 1). These differences were found especially between the sufficiently active and the inactive and between the insufficiently active and the inactive ($p < .001$). In the inactive group, women’s BMI scores were higher ($p < .05$) than those of men (Table 2), and in Arabs higher ($p < .05$) than in Jews ($p < .05$).

People who were more active had significantly less difficulty in functioning (Table 1). The inactive had significantly more difficulties than the sufficiently active ($p < .001$) and also more than the insufficiently active ($p < .001$). Women’s scores were higher than those of men (Table 2), especially in the inactive group ($p < .001$) but also in the sufficiently active ($p < .05$). Although, in general, Arabs had more difficulties in their functioning level than Jews (Table 3; $p < .003$), no paired-groups differences were demonstrated.

Although a trend of more chronic illnesses and more medications in the inactive group and less in the sufficiently active was noticed (Table 1), no significant differences were found. In addition, no gender (Table 2) or sector (Table 3) differences were noted on those variables.

Significant differences were observed between the activity groups (Table 1). The inactive rated their health worse than did either the insufficiently active ($p < .002$) or the sufficiently active ($p < .001$). Although gender differences were borderline in terms of significance (Table 2), in paired-groups comparisons women rated their health significantly worse than did men in the sufficiently active ($p < .001$) and inactive groups ($p < .05$). Jews rated their health worse than did Arabs (Table 3), specifically in the inactive group ($p < .001$).

Table 4 specifies the types of activities in which older adults are engaged, in terms of percentage of people and time devoted to type of activity. The activities were categorized as follows: walking (outdoors or on a treadmill), jogging, swimming, cycling (bike riding or stationary cycling), light exercise (yoga, Feldenkrais, Alexander’s method, light gymnastics), and body shaping (including strength training).
Table 4  Types of Activity in the Sufficiently and Insufficiently Active Older Adults

<table>
<thead>
<tr>
<th></th>
<th>Sufficiently Active</th>
<th></th>
<th>Insufficiently Active</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>Average time, min/week (SD)</td>
<td>n (%)</td>
<td>Average time, min/week (SD)</td>
</tr>
<tr>
<td>Walking</td>
<td>503 (91)</td>
<td>144.8 (90.73)</td>
<td>309 (68)</td>
<td>56.71 (26.80)</td>
</tr>
<tr>
<td>Light exercise</td>
<td>199 (36)</td>
<td>74.04 (49.98)</td>
<td>189 (42)</td>
<td>43.05 (24.42)</td>
</tr>
<tr>
<td>Swimming</td>
<td>135 (24)</td>
<td>86.92 (71.41)</td>
<td>38 (8)</td>
<td>46.49 (25.07)</td>
</tr>
<tr>
<td>Body shaping</td>
<td>67 (23)</td>
<td>72.54 (57.32)</td>
<td>15 (7)</td>
<td>40.00 (0)</td>
</tr>
<tr>
<td>Cycling</td>
<td>71 (13)</td>
<td>62.06 (59.17)</td>
<td>23 (5)</td>
<td>37.39 (31.51)</td>
</tr>
<tr>
<td>Jogging</td>
<td>10 (4)</td>
<td>48.00 (23.48)</td>
<td>1 (0.5)</td>
<td>80.00 (0)</td>
</tr>
</tbody>
</table>

Discussion

Our results showed that most older Israelis do not meet the recommended guidelines for physical activity in terms of energy expenditure and that a large segment of this population is inactive or insufficiently active. The trend of extended life expectancy along with a sedentary lifestyle, which is typical of quite a few Western cultures, is also typical of Israel. Only 33% of older adults in Israel are sufficiently active, compared with 55% in Australia, 21.8% in the United States, and 10% in the United Kingdom. More than one third (39%) of older adults in Israel do not engage in any physical activity, like 66% in the United Kingdom (Taylor et al., 2004), 52.6% in the United States (Kruger et al., 2007), and 26% in Australia (Brownie, 2005).

As in previous population-based studies covering all adult ages in the United States (USDHHS, 1996, 2000) and in Israel (Baron-Epel et al., 2005), men in the current study reported engaging in more activity than did women. Previous studies inquiring about incentives to exercise (e.g., Koivula, 1999), including a study on Israelis of all ages (Raviv & Netz, 2007), showed that men were more competitive than women and thus engaged more in sport and exercise. This was explained by the differences in stereotypical social expectations encouraging men to engage in physical activity that allows them to compare their performance with that of others. A unique explanation referring specifically to men in Israel was provided by Raviv and Netz. They suggested that the high importance that Israeli men attribute to fitness may indicate that maintaining a “good form” or physical condition is almost a sine qua non for Israeli men as long as they serve in the IDF (Israel Defense Forces), which is often to age 50 or more in their reserve duty. Such an obligation may influence their general attitude toward the importance of physical activity and can affect their perception of personal investment in this area.

In support of previous studies in the United States (USDHHS, 1996, 2000) and in Israel (Baron-Epel et al., 2005), less education and lower income were related to less activity. In addition, the Arab minorities engaged in less activity than Jews.
Similar gender, education, and ethnic (e.g., minorities) differences were observed in a study on older adults in the United States (Kruger et al., 2007). Although similar gender differences were observed in a population-based study in Swedish adults, in that group high income and higher education were not associated with more physical activity (Bergman, Grijibovski, Hagstromer, Bauman, & Sjostrom, 2008). It is possible that some trends overlap. For example, women in the current study reported fewer years of education and lower income than men (Table 2), and Arabs reported fewer years of education and lower income than Jews (Table 3).

Of special interest are two more unique sociocultural variables that were explored in older adults in the current study in relation to physical activity: being religious or secular (for both Arabs and Jews) and country of origin (for Jews only). In the sufficiently active group there were significantly more secular individuals than religious, and in the inactive group there were more religious individuals than secular (Table 1). This trend was observed in both genders (Table 2) and in both sectors (Jews and Arabs), although significance was reached only for Jews (Table 3). This finding may be attributed to a different social lifestyle among religious people compared with secular. For example, in a study conducted on the contribution of social-network type to the prediction of physical activity in the Jewish population in Israel, it was demonstrated that older adults who belonged to a family network (a network that relied mainly on ties within their large immediate families) attended synagogue more frequently than any other network type and were less physically active than those in other social networks (Litwin, 2003). It may be useful to encourage both Jewish and Arab religious leaders to partake in and legitimize health-promotion activities to encourage older religious adults to exercise on a routine basis. By receiving encouragement from Jewish and Arab clergy to legitimatize partaking in exercise, religious followers in the older population might be more willing to engage in physical activity.

Jewish older adults in Israel are a unique population in terms of birthplace. In 2007 only 15% of older adults (65+) were born in Israel (compared with 67% in the general population); 55% were born in Europe or the United States, and 30% in Asia or Africa (Mashav Planning for the Elderly, 2008). Older adults who were born in Israel, Europe, or the United States generally have a higher mean number of years of education than those born in Asia and Africa (Mashav Planning for the Elderly, 2008). These educational differences may explain the higher percentage of Israeli-, European-, and U.S.-born individuals in the sufficiently active group than of people born in other countries and the opposite trend among the inactive group (Table 1).

The physiological, functional, and health-related differences observed in the activity groups were predictable. The relationship between level of physical activity and self-rated health is in line with previous studies conducted on all ages (Bergman et al., 2008), including a study reporting on Israelis (Baron-Epel et al., 2005). The differences between the activity groups in BMI and functioning level and the trend observed in the number of chronic illnesses and number of medications indicated a relationship between those variables and level of activity, with the sufficiently active individuals reporting fewer health and functioning-related difficulties and having lower BMI (Table 1). It should be noted that all groups of participants in the current study had a mean BMI higher than 25, which is considered overweight; the inactive women and inactive Arabs had mean BMIs of 30.25 (Table 2) and 31.17
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(Table 3), respectively, which is considered obese (U.S. Preventive Services Task Force, 2003). Jews in all levels of activity rated their health significantly poorer than did Arabs and tended to use more medications (Table 3). One explanation for this difference is the fact that the Arabs in this study (just as in the general older age population) were significantly younger than the Jews (Mashav Planning for the Elderly, 2008). On the other hand, although the women in this study were younger than the men, they reported having more functioning problems than men did (Table 2). This means that special efforts should be made to encourage women to overcome health and other barriers and engage in physical activity.

Studies have indicated that older adults concentrate predominantly on health-related issues as reasons for not exercising (Cohen-Mansfield, Marx, & Guralnik, 2003; Netz, Zeev, Arnon, & Tenenbaum, 2008). This finding was verified in Israeli Jewish older adults, who specified illness as the most common obstacle to exercise (Zach & Netz, 2007). On the other hand, in a study assessing incentives to exercise in Israel, older adults viewed health benefits as the most important incentive to exercise. Unlike young participants, who engaged in exercise mainly for psychosocial reasons in addition to fitness, older adults engaged in exercise only for exercise-specific incentives such as health benefits and fitness (Raviv & Netz, 2007). However, it is worth mentioning that except for the health benefits, older adults in that study generally allocated less importance to exercise than did the younger age groups and showed less motivation to exercise. One explanation suggested in that study was that many Jewish older adults were brought up as part of “the people of the book” (for whom intellectual and spiritual pursuits were more important than physical pursuits), and thus physical activity was perceived as a “waste of time.” Another study, one not focusing on a Jewish population, also indicated that older adults viewed exercise as an inappropriate activity (Melillo et al., 2001).

The fact that an age-related decline in physical activity has been indicated in quite a few population-based studies (e.g., Bergman et al., 2008; USDHHS, 1996, 2000) may support the hypothesis that there is a biological basis for this decline among both nonhuman subjects (Ingram, 2000) and humans (Sallis, 2000). The dopaminergic neurotransmitter system appears to be a possible neurobiological mechanism that can explain this decline (Ingram, 2000). It is interesting that this mechanism not only affects the ability to move but also involves motivational factors, or the “will” to participate in physical activity. This explanation gains support from a study exploring age differences in reasons given for omitting exercise (Netz et al., 2008). It was found in that study that in addition to health, older adults select internal character traits as reasons for not exercising, whereas young people select more external reasons such as lack of time or lack of facilities. The implications are that in addition to educational, informative, and technical strategies, intervention programs aimed at changing behavior should include in-depth psychological techniques geared toward changing attitudes and overcoming the deep natural inclination to adopt a sedentary lifestyle.

The health–physical activity relationship in advanced age is reciprocal. Health deteriorates as a result of lack of activity, but it is also an accepted reason or excuse for not being active. This is especially indicated in the inactive group, which reported the highest rate of functional difficulties, chronic diseases, and number of medications. Therefore, special efforts should be made to explain to older adults that physical activity is vital not only for prevention purposes but
also for the management and treatment of many chronic diseases and disabilities including arthritis, cancer, chronic obstructive pulmonary disease, chronic renal failure, cognitive impairment, congestive heart failure, coronary artery disease, depression, hypertension, osteoporosis, peripheral vascular disease, stroke, and Type 2 diabetes (ACSM, 2009; USDHHS, 1996). This means that special physical activity programs should be designed for people with chronic diseases and disabilities, such as cardiac rehabilitation programs focusing on gradual aerobic training, programs for osteoporosis emphasizing strength training, or programs specifically for cognitively impaired older adults.

Some precautions should be taken in interpreting our data, because there was a large reduction in our survey population, creating an overrepresentation of better educated, secular, healthier, and financially better-off individuals. This pattern of lower participation of disadvantaged socioeconomic groups in health surveys has been pointed out in epidemiological studies (e.g., Lorant, Demarest, Miermans, & Van Oyen, 2007). One explanation of this low participation is that certain risk factors such as being sedentary are more common in less-well-educated individuals. Given the importance of lifestyle in health surveys and the increasing public pressure to be active, it is possible that individuals of lower socioeconomic status decline participation for fear of being stigmatized (Lorant et al., 2007).

There are indications that those who are less educated, have more health problems, are poorer, or are religious are less active, so it is possible that the rate of inactivity in older adults in Israel is greater than we found. Indeed, the rate of sedentary people in our study was 33.3% for Jews and 66.7% for Arabs, compared with 45.8% and 79%, respectively, reported by the Israel Center for Disease Control based on data collected in 2002–2003 on people 65 and over (Baron-Epel et al., 2005). However, the strength of our study is the fact that it identifies the sufficiently active individuals among those who are active. Despite the overrepresentation of the demographically (i.e., income, education) and physically (i.e., less dependent and healthier) better-off segments of the population in our study, only 36.4% of the Jewish sector in our study were identified as sufficiently active, compared with 41.8% reported by the Israel Center for Disease Control (Baron-Epel et al., 2005). Given the oversampling of higher segments, the rate of the sufficiently active individuals is probably lower than what we found but most likely smaller than the 41.8% reported by Baron-Epel et al. It also means that the general information provided by the CBS (Israel CBS, 2008) that 41.3% are active three times a week does not provide any indication of the percentage of those who meet the recommendation for physical activity for preserving health and functioning, and most likely it is much less than 41.3%. On the other hand, a recent longitudinal study of a birth cohort of Jewish Jerusalem residents reported that 53.4% of the participants at age 70, 76.9% at age 78, and 64% at age 85 were physically active (Stessman et al., 2009).

It should be noted that the recommended amount of aerobic activity is in addition to the light-intensity routine activities of daily living (e.g., self-care, cooking, casual walking, or shopping) or moderate-intensity activities lasting less than 10 min (e.g., walking around the home or office, walking from the parking lot; Nelson et al., 2007). Furthermore, in contradiction to the longitudinal Jerusalem study (Stessman et al., 2009) that did not show a dose-dependent association between physical activity and mortality, participation in physical activity above the minimum recommended amounts—higher intensity, greater frequency, or longer duration—has been shown to provide additional health benefits (ACSM,
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The implications are that merely encouraging older adults to be active is not adequate. Intervention programs should emphasize the recommended guidelines for physical activity for preserving health and functioning. Furthermore, these programs should explain that if there are no conditions that preclude greater amounts of physical activity, older adults can exceed the minimum recommended amounts to (a) improve their personal fitness, (b) improve management of an existing disease for which it is known that higher levels of physical activity have greater therapeutic benefits, or (c) further reduce their risk for premature chronic health conditions and mortality related to physical inactivity (Nelson et al., 2007).

The most frequently reported physical activity in this study was walking, which is known to be the most common type of activity for older adults (ACSM, 2009) and was also reported in previous surveys of older adults in Israel (Mashav Planning for the Elderly, 2001). The order of preferred activities was common to both sufficiently and insufficiently active individuals, with light exercise following walking, followed by swimming, body shaping, cycling, and jogging. This order of preferred activities is in agreement with a previous study conducted on older adults in Israel (Litwin, 2003). Based on the official guidelines of physical activity, any modality that does not impose excessive orthopedic stress is recommended, and aquatic exercise and stationary-cycle exercise may be advantageous for those with limited tolerance for weight-bearing activity (ACSM, 2009).

A limitation of our study is its focus on energy expenditure representing only aerobic activity and cardiovascular fitness. Although cardiovascular fitness is probably the most important component of fitness, undoubtedly reducing the risk of premature chronic health conditions and mortality (Kodama et al., 2009), the official guidelines also include strength training, flexibility training, and balance exercise, all of which promote functional independence and skeletal health (Nelson et al., 2007). It is therefore recommended that further studies assess the prevalence of these activities in older adults in Israel, based on the recommended guidelines.

Another limitation of the current study is that physical activity was measured via self-report, using an unvalidated questionnaire. Self-reports are subjective and do not necessarily reflect actual physical activity. However, almost all population-based studies assessing rate of physical activity in a relatively large number of people (including all the studies mentioned in the current article) use self-reports, because this method is far less expensive than using objective measures of physical activity. Furthermore, a study assessing the association between physical activity and mortality, which used both direct measurement of total energy expenditure and a self-reported physical activity questionnaire, found that the strength and direction of effect of activity on mortality as measured directly and by self-reports were comparable (Manini et al., 2006).

Finally, the official recommended guidelines require a certain amount of physical activity and even stress that older adults should exceed the minimum recommended amounts of physical activity if they have no conditions that preclude it. However, they also stress that if older adults cannot do the recommended amount because of chronic conditions, they should be as physically active as their abilities and conditions allow (ACSM, 2009; USDHHS, 2008). This means that physical activity promotion should highlight the minimum amount of exercise recommended for preserving health and functioning but also underscore that if this is not possible any amount of activity can be beneficial.
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References


