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Article *in* JAMA The Journal of the American Medical Association · March 2010

DOI: 10.1001/jama.2010.312 · Source: PubMed

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Published in final edited form as:
JAMA. 2010 March 24; 303(12): 1173–1179. doi:10.1001/jama.2010.312.

Physical Activity and Weight Gain Prevention

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Abstract

Context—The amount of physical activity needed to prevent long-term weight gain is unclear. In 2008, federal guidelines recommended ≥150min/week (7.5 MET-hr/week) of moderate-intensity activity for "substantial health benefits".

Objective—To examine the association of different amounts of physical activity with long-term weight changes among women consuming a usual diet.

Design, Setting, and Participants—Prospective cohort study, following 34,079 healthy, US women (mean age, 54.2 years) from 1992–2007. At baseline, 36-, 72-, 96-, 120-, 144- and 156-months' follow-up, women reported their physical activity and body weight. Women were classified as expending <7.5, 7.5-<21, and ≥21 MET-hr/week of activity at each time. Repeated measures regression prospectively examined physical activity and weight change over intervals averaging 3 years.

Main Outcome Measure—Change in weight.

Results—Women gained a mean of 2.6 kg throughout the study. In multivariate analysis, compared with women expending ≥21 MET-hr/week, those expending 7.5-<21 and <7.5 MET-hr/week gained 0.11 kg (SD=0.04; P=0.003) and 0.12 kg (SD=0.04; P=0.002), respectively, over a mean interval of 3 years. There was a significant interaction by body mass index (BMI), such that there was an inverse dose-response relation between activity levels and weight gain among women with BMI <25 kg/m^2 (P, trend <0.0001), but no relation among heavier women (P, trend=0.56 and 0.50, respectively, for BMI 25–29.9 and ≥30.0 kg/m^2). A total of 4,540 women (13.3%) began the study with BMI <25

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Author Contributions: Dr. Lee had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: Lee
Acquisition of the data: Lee, Buring
Analysis and interpretation of data: Lee, Djoussé, Sesso, Wang, Buring
Drafting of the manuscript: Lee
Critical revision of the manuscript for important intellectual content: Lee, Djoussé, Sesso, Wang, Buring
Statistical analysis: Djoussé
Obtained funding: Lee, Buring, Sesso
Study supervision: Lee, Buring
Administrative, technical, or material support: Lee

Financial Disclosures: Dr. Lee serves as a consultant to Virgin HealthMiles, and sits on their Scientific Advisory Board. No other financial disclosures are reported.

kg/m^2 and successfully maintained their weight, gaining <2.3 kg throughout; their mean activity level over the study was 21.5 MET-hr/week (~60 min/day moderate-intensity activity).

Conclusion—Among women consuming a usual diet, physical activity was associated with less weight gain only among women with BMI <25 kg/m^2. Women successful in maintaining normal weight and gaining <2.3 kg over 13 years averaged ~60 min/day of moderate-intensity activity over the study duration.

The prevalence of overweight/obesity in the United States has increased dramatically over the past two decades, with 1 in 3 adults currently obese.[1] These numbers present a tremendous challenge—for both health care and health care costs—because many adverse health conditions are associated with excess body weights.[2, 3]

At a fundamental level, weight gain occurs when caloric intake exceeds caloric expenditure. Many studies have examined physical activity, with or without caloric restriction, and weight loss among overweight/obese persons.[4] Effective strategies do exist for weight loss, but the majority of persons losing weight do not maintain their weight loss.[5, 6] Since the average US adult gains weight with age,[7, 8] prevention of unhealthy weight gain is important because this avoids the problem of subsequently having to lose weight and maintain weight loss for health. Presently, little research exists on the prevention of weight gain, as contrasted to the vast body of research on the treatment of overweight/obese individuals.[2]

Essential for the prevention of unhealthy weight gain are clear guidelines on the amount of physical activity required. Current recommendations, including the 2008 federal guidelines for overall health, ask for ≥150 min/week of moderate-intensity, aerobic physical activity for "substantial health benefits".9, 10 However, it is unclear whether this amount can prevent weight gain.11, [12] Indeed, the Institute of Medicine (IOM) suggests that 60 min/day (420 min/week) of moderate-intensity activity may be needed to prevent transition to overweight or obesity,[13] but the basis for this recommendation has been questioned.12 Because these recommendations differ by almost 3-fold—150 versus 420 min/week—with the lower level likely to be palatable but the higher level a deterrent to many, this is an important issue to clarify.

We therefore examined weight changes associated with different physical activity levels, focusing on the 150 versus 420 min/week recommendations, in a large cohort of women followed for 13 years.

METHODS

Study Participants

Participants were from the Women's Health Study, a completed randomized trial testing low-dose aspirin and vitamin E for preventing cardiovascular disease and cancer among 39,876 US female health professionals, begun in 1992.14–16 At baseline, women were free of coronary heart disease, cerebrovascular disease, cancer (except nonmelanoma skin cancer), and other major chronic illnesses. Women provided written consent to participate, and the study is approved by the IRB committee, Brigham and Women's Hospital. At trial completion in March 2004, 33,796 women (88.0% of those alive) consented to continue in an observational follow-up study.

During the trial, women completed health questionnaires every 6 months during the first year and annually thereafter. During observational follow-up, they completed questionnaires annually, with cycle 1 beginning in May 2005. Reported cardiovascular disease and cancer were confirmed with medical records.

For this study, we excluded women developing cardiovascular disease and cancer (n=5,331) prior to the end of the study (cycle 3 of observational follow-up) since these diseases may influence weight, and women with missing physical activity or weight at baseline (n=466), leaving 34,079 women.

Assessment of Physical Activity

At baseline, women reported the average time per week spent on eight groups of recreational activities over the past year: walking or hiking; jogging (slower than 10 minute miles); running (10 minute miles or faster): bicycling, including use of stationary machines; aerobic exercise, aerobic dance, or use of exercise machines; lower intensity exercise, yoga, stretching, or toning; tennis, squash, or racquetball; and lap swimming. They also reported their usual walking pace and flights of stairs climbed daily. We estimated the energy expended on each group of activities[17] in MET-hr/week and summed this across all activities to estimate weekly energy expenditure.

This questionnaire was adapted from the College Alumni Health Study physical activity questionnaire, which has been extensively tested for reliability and validity, including validation against doubly-labeled water (Spearman r=0.67 for recreational activities).[18] The original questionnaire allowed open-ended listing of activities; the adapted questionnaire listed activities most commonly carried out by women. For this adapted questionnaire, in a random sample of nurses, the test-retest correlation coefficient over two years was 0.59.19 Questionnaire estimates, compared with 4 past-week recalls of physical activity spaced over one year prior to questionnaire administration, yielded a correlation of 0.79; compared with activity diaries kept for 4 weeks spaced over the same year, 0.62.19

Physical activity was updated at 36, 72, and 96 months during the trial, at trial conclusion, and cycle 2 of observational follow-up, referred to as the 36-, 72-, 96-, 120-, and 144-month follow-up.

We classified women into three groups at each assessment:

- <7.5 MET-hr/week (equivalent to <150 min/week of moderate-intensity physical activity, the minimum recommended by the federal government,[20] and the American College of Sports Medicine and the American Heart Association9;
- 7.5 to <21 MET-hr/week; and
- ≥21 MET-hr/week (equivalent to ≥420 min/week of moderate-intensity activity, the IOM recommendation13)

Assessment of Body Weight and Other Variables

Women reported their body weight at baseline, and regularly during follow-up. For the present study, we used baseline, 36-, 72-, 96-, 120-, and 156-month follow-up weights. Among nurses, self-reported weight is highly correlated (r=0.96) with directly measured weight.[21]

Women also reported information on potential confounders of the association between physical activity and weight change: race (self-declared), education, height, smoking, menopausal status, post-menopausal hormone use, diabetes, hypertension, alcohol intake, and diet measured by a 131-item food frequency questionnaire.[22]

Statistical Analyses

We first compared characteristics among the three physical activity groups at baseline, and examined physical activity and weight trends during the study.

Next, we examined prospective changes in body weight, according to the three activity groups, with physical activity updated over time, and using repeated measures linear regression to account for the correlation of within-woman repeated observations.[23] For example, physical activity at baseline was related to weight change from baseline to 36 months, physical activity at 36 months was related to weight change from 36 to 72 months, etc. Initial models adjusted for age, baseline weight, height, and time interval between weight assessments (all continuous variables). Fully-adjusted models additionally considered race (white, non-white), education (two-year associate's degree or less, three-year associate's degree, bachelor's degree, master's degree and higher), smoking (never, past, current), menopausal status (pre-, post-menopausal, uncertain), postmenopausal hormone therapy (never, past, current), diagnosis of diabetes and hypertension (both no, yes), alcohol intake (never, 1–3/month, 1–4/week, ≥5/week), and quintiles of intakes of total energy, saturated fat, fruits and vegetables. We also examined changes in BMI. Since the findings were very similar as mean height was identical across groups, we present only the findings for weight, a more interpretable measure. We examined interactions between physical activity and age (<55, 55–64, ≥65 years), BMI (normal weight, BMI <25; overweight, 25-<30; obese, ≥30 kg/m^2), smoking, and menopausal status (both classified as above) with respect to weight change.

In parallel analyses, we examined prospectively the odd ratios (95% confidence intervals, CI) for meaningful weight gain, defined as ≥2.3 kg (5 lb),[24] in the interval between physical activity and weight assessments, according to the three physical activity groups and using repeated measures logistic regression. Post-hoc power calculations using alpha=0.05 and a 2-sided test showed >99% power to detect a trend across groups, with odds ratio=1.11 comparing extreme groups.

Analyses were conducted using SAS release 9.1.3.

RESULTS

The mean age of women at baseline was 54.2 years; this was similar across physical activity groups (Table 1). BMI was inversely related to activity level, as was weight, while mean height was identical across groups. Race was similarly distributed across groups, as was the proportion of postmenopausal women. More active women were more likely to have had postgraduate education and use postmenopausal hormones; they also had healthier risk factor and medical history profiles.

The mean follow-up from baseline to 156-months was 13.1 years. At baseline, 49.5% of women expended <7.5 MET-hr/week on physical activity; 28.8%, 7.5-<21 MET-hr/week; and 21.7%, ≥21 MET-hr/week (Figure 1). The proportion of women in the least active category declined over time, while that in the most active category increased, so that at 144 months, when physical activity was last assessed, 34.2% expended <7.5 MET-hr/week and 35.5% expended ≥21 MET-hr/week. In part, this likely reflected the fact that women who continued in the observational component (120 to 156 months) were a somewhat healthier subgroup.

As expected, women gained weight over time. At baseline, the mean weight was 70.2 kg; at the end of the study, 72.8 kg. Figure 2 shows the trajectory of weight gain over time, by baseline physical activity levels. When classified by this single measure of physical activity, all three groups showed similar weight gain patterns over time.

We next examined prospective changes in weight, according to physical activity level and allowing physical activity to be updated over time. The mean interval during which weight change was assessed was 2.88 (SD=0.41) years. Compared with women expending ≥21 MET-hr/week, those expending 7.5-<21 MET-hr/week gained 0.11 kg (SD=0.04) in a fully-adjusted model (Table 2), while those expending <7.5 MET-hr/week gained 0.12 kg (SD=0.04). The

difference in weight gain between these two groups—0.11 versus 0.12 kg—was not statistically significant (P=0.77).

We investigated whether the association between physical activity and weight change was modified by age, BMI, smoking, or menopausal status, and found significant interactions with age, BMI (both P<0.0001), and menopausal status (P=0.04) (Table 2). The trend of increasing weight gain with lower levels of activity appeared only among women <65 years, and among women with BMI <25 kg/m^2, and the magnitude of gain was larger in least active pre-than post-menopausal women.

We then prospectively examined the likelihood of gaining ≥2.3 kg over a mean interval of 2.88 years (Table 3). Compared with women expending ≥21 MET-hr/week, those expending 7.5-<21 and <7.5 MET-hr/week were 7% (95% CI, 4–11%) and 11% (7–14%) significantly more likely to gain ≥2.3 kg in a fully-adjusted model. We observed a significant interaction with BMI (P<0.0001), but not age, smoking, or menopausal status (all P>0.05). Only among women with BMI <25 kg/m^2 was there less likelihood of ≥2.3 kg weight gain with higher levels of physical activity (P, trend <0.0001); there was no relation among women with BMI 25-<30 or ≥30 kg/m^2 (P, trend=0.13 and 0.37, respectively).

Finally, we investigated how much physical activity was carried out by women who successfully maintained normal weight. We identified 4,540 women (13.3%) with normal BMI at baseline, who remained at normal BMI throughout the study while gaining <2.3 kg over baseline weight at any time point assessed. Their mean activity levels at baseline, 36-, 72-, 96-, 120-, and 144-months were 17.6, 19.9, 18.9, 22.1, 24.2, and 26.1 MET-hr/week, respectively, for a mean of 21.5 MET-hr/week during follow-up.

COMMENT

In this large cohort of middle-aged and older women followed for 13 years, there was an overall weight gain over time. Compared with women who engaged in the equivalent of ≥420 min/week (60 min/day) of moderate-intensity physical activity, those carrying out 150-<420 min/week of such activity, as well as those less active (<150 min/week), gained significantly more weight, with no difference in weight gain between these two lesser active groups. The two lesser active groups also were significantly more likely to gain ≥2.3 kg (5 lb) over a 3-year period than the most active group. There was an interaction of these associations with BMI, such that physical activity was inversely related to weight gain only among normal weight women; there was no relation among heavier women. Normal weight women who successfully maintained their normal weight and gained <2.3 kg throughout the 13-year study spent the equivalent of 60 min/day in moderate-intensity activity—the level recommended by the IOM for the prevention of unhealthy weight gain.[13]

These results highlight two important points for weight gain prevention. First, once overweight, it may be “too late” since physical activity—at least, at levels carried out by study participants—was not associated with less weight gain. Second, sustaining high levels of physical activity (~60 min/day) is needed to successfully maintain normal BMI and prevent weight gain: women with this level of physical activity at baseline only (who may not have sustained the level over the study duration) gained weight at a similar trajectory as less active women (Figure 2).

The rate of weight gain in this study—2.6 kg over 13 years—was very similar to that observed between 1992 and 2000 among nationally representative women aged 51–61 years.[8] This seemingly small amount of weight gain is sufficient to adversely affect health.[2, 3] Preventing weight gain is preferable to treating overweight/obesity because of the limited sustainability of weight loss.[5, 6] For example, in a recent randomized trial of weight loss in overweight/obese women, even with extensive counseling on diet and exercise and the provision of treadmills

in subjects' homes, the 8–10% weight loss at 6 months could not be sustained at 24 months.[25] In another study where overweight/obese men and women had lost 8.5 kg, weight regain of 4.0–5.5 kg over 30 months occurred in all groups, randomized to different behavioral interventions to maintain weight loss.[26]

Because weight gain results from an imbalance between energy intake and expenditure, one important question for weight gain prevention, among individuals consuming a usual US diet, is the amount of physical activity needed. The available data are unclear, particularly for long-term weight gain prevention. Current national and international recommendations for preventing unhealthy weight gain have variously targeted 45–60 min/day of moderate-to-vigorous activity, but acknowledge the limited basis for this amount.[10, 12, 13, 20, 27] Cross-sectional studies consistently indicate an inverse, dose-response relation; however, the direction of the relation is unclear with this study design (does physical activity lead to lower body weight, or is higher body weight a deterrent to activity?)[10] Prospective cohort studies with follow-up of 6.5 years or longer show consistent associations between increased physical activity levels, generally assessed at two time points only, and less weight gain.10 It is difficult to infer the amount of physical activity carried out in these studies because studies typically analyzed physical activity as a continuous variable, or grouped subjects into categories of increase, decrease, or no change in physical activity.[10, 28] Several randomized controlled trials testing different amounts of physical activity exist, where the primary outcome was not weight, but where weight was recorded.[10] These trials are short-term, lasting 8–16 months, and suggest that physical activity on the order of 13–26 MET-hr/week over this short interval results in <3% weight change.[10, 29–31] The data from our long-term observational study are congruent with this activity range.

Most of the studies discussed above have used self-reported physical activity, as has our study, which may be limited. However, studies with objective measures of physical activity and weight change are sparse. The IOM recommendation on the amount of physical activity to maintain weight was based on data from doubly-labeled water studies world-wide.[13] The expert panel estimated the activity level among 407 normal weight men and women to be 60 min/day of moderate-intensity activity. However, not examined by the panel were the 360 overweight or obese subjects in the doubly-labeled water studies, where physical activity levels were similar to, or even higher than, those among normal weight subjects.[12] Thus, these data, in addition to being cross-sectional, do not fully support the IOM conclusion that 60 minutes/day of activity is needed for maintaining normal weight. Another study of 74 Pima Indians reported a negative, non-significant correlation between physical activity, measured using doubly-labeled water, at baseline and weight change over 4 years; the lack of significance may be due to the small sample.[32]

Strengths of the present study include the large number of women followed prospectively for a long period, with multiple assessments of physical activity and body weight. Women were classified according to clinically relevant groups corresponding to physical activity recommendations. We also adjusted for many variables that could potentially confound the physical activity-weight relation.

Limitations include self-reported recreational physical activity and weight. However, the physical activity questionnaire used has shown good reliability and validity,[18, 19] and physical activity in the present study has shown expected associations with chronic disease outcomes.[33–35] Self-reported body weight also is highly correlated (r=0.96) with directly measured weight in health professionals.[21] We did not have detailed information on other measures of body composition, nor on medications potentially affecting weight. Further, participants are not representative of the US population; however, their rate of weight gain was similar to that of comparably aged women in the general population.8 While we adjusted for baseline diet,

we did not have repeated measures of diet over time. We also did not examine activity levels needed for weight management among women restricting caloric intake, since our intent was to investigate women with a usual diet.

In conclusion, in this large prospective study of women consuming a usual diet, sustained moderate-intensity physical activity for ~60 min/day was needed to maintain normal weight and prevent weight gain. These data suggest that the 2008 federal recommendation for 150 min/week, while clearly sufficient to lower the risks of chronic diseases, is insufficient for weight gain prevention absent caloric restriction. Physical activity was inversely related to weight gain only among normal weight women; among heavier women, there was no relation, emphasizing the importance of controlling caloric intake for weight maintenance in this group.

Acknowledgments

The authors would like to acknowledge the crucial contributions of the entire staff of the Women's Health Study, and are also indebted to the 39,876 dedicated and committed participants of the Women's Health Study.

Funding/Support: This work was supported by grants CA047988, HL043851, HL080467, and DK081141 from the National Institutes of Health.

Role of the Sponsors: The sponsors had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript.

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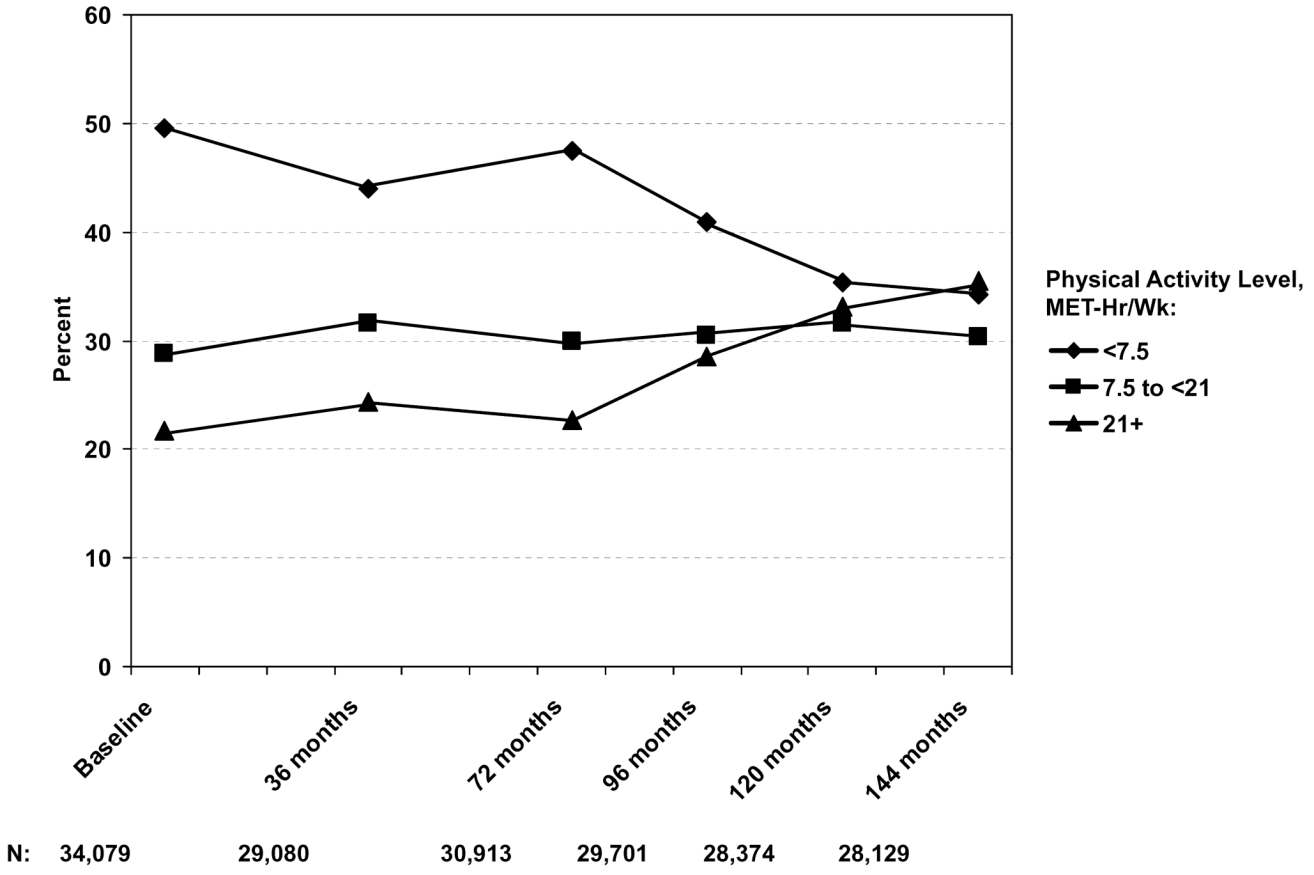

Figure 1.

Physical Activity Levelsa over Study Duration, Women's Health Study

Numbers below the x-axis indicate the number of women contributing data to each time period.

[a] See footnote to Table 1 regarding physical activity levels.

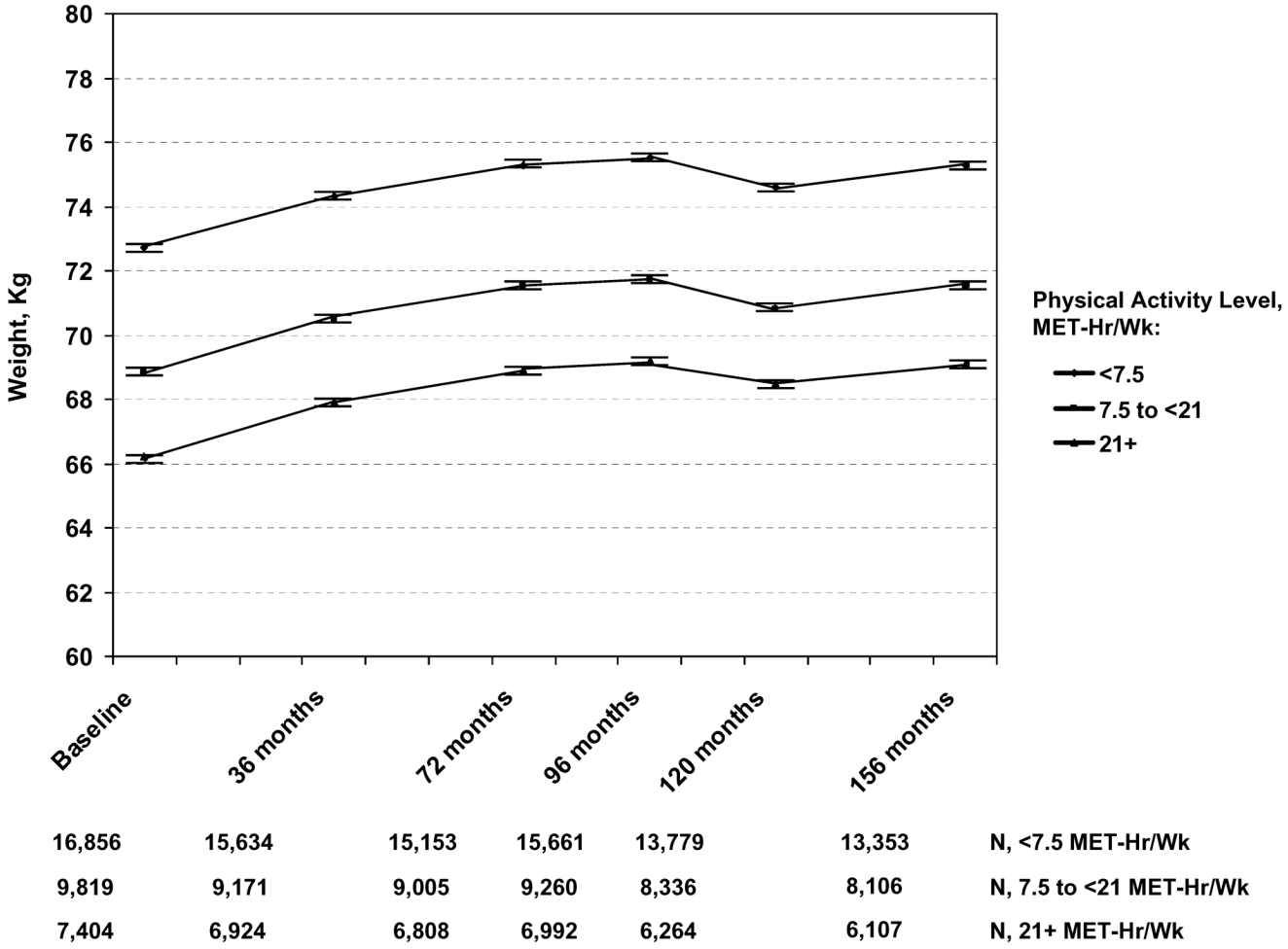

Figure 2.

Mean Weight,a according to Baseline Physical Activity Levels,b over Study Duration, Women's Health Study

Numbers below the x-axis indicate the number of women contributing data to each time period.

[a] Vertical bars represent 95% confidence intervals.

[b] See footnote to Table 1 regarding physical activity levels.

Table 1

Baseline Characteristics of Women According to Physical Activity Level, Women's Health Study
(apart from physical activity, weight, and body mass index, not all women had information on each characteristic)

	Physical Activity (MET-Hr/Week)[a]		
Characteristics	**<7.5 (n=16,856)**	**7.5–<21 (n=9,819)**	**≥21 (n=7,404)**
Age, mean ±SD (yr)	54.1±6.8	54.3±6.9	54.2±6.9
Body mass index, mean ±SD (kg/m^2)	26.9±5.5	25.5±4.5	24.5±4.1
Weight, mean ±SD (kg)	72.7±15.7	68.8±13.0	66.2±12.0
Height, mean ±SD (cm)	164.1±6.3	164.1±6.2	164.1±6.3
Race (% white)	94.3	95.5	94.5
Postgraduate education (%)	17.4	21.6	24.1
Postmenopausal (%)	52.0	52.5	52.4
Postmenopausal hormone therapy (%)	39.4	41.6	43.1
Current smoking (%)	15.6	9.7	8.3
Alcohol intake (%)	50.5	57.7	62.4
Energy intake, mean ±SD (kcal/day)	1708±542	1739±521	1755±537
Saturated fat, mean ±SD (g/day)	20.6±4.8	19.2±4.6	18.1±4.8
Fruits and vegetables, mean ±SD (servings/day)	5.5±3.4	6.4±3.4	7.2±4.2
Hypertension (%)	27.0	23.3	20.2
Diabetes mellitus (%)	2.4	2.2	1.3

[a] 7.5 MET-hr/week is equivalent to 150 min/week of moderate-intensity physical activity, the minimum recommended by the federal government; [20] 21 MET-hr/week is equivalent to 60 min/day (420 min/week) of moderate-intensity physical activity, recommended by the Institute of Medicine. [13]

Table 2

Mean Differences in Weight (Kilograms)[a] over Any 3-Year Period,[b] According to Physical Activity Level, Women's Health Study, 1992–2007

	Physical Activity (MET-Hr/Week)[c]				
Group	**<7.5**	**7.5–<21**	**≥21**	**P, Trend**	**P, Interaction**
All women					
Model 1	0.15±0.04	0.12±0.04	Referent	<0.0001	--
Model 2	0.12±0.04	0.11±0.04	Referent	<0.0001	--
Women, by age[d]					<0.0001
<55 yr (n=21,363)[e]	0.12±0.08	0.02±0.08	Referent	0.0005	
55 – 64 yr (n=9,699)	0.24±0.06	0.19±0.06	Referent	<0.0001	
≥65 yr (n=3,017)	−0.09±0.07	0.07±0.07	Referent	0.13	
Women, by BMI[d]					<0.0001
<25.0 kg/m^2 (n=17,475)	0.21±0.04	0.14±0.04	Referent	<0.0001	
25 – 29.9 kg/m^2 (n=10,516)	−0.04±0.06	−0.04±0.06	Referent	0.56	
≥30.0 kg/m^2 (n=6,088)	0.16±0.14	0.13±0.16	Referent	0.50	
Women, by smoking status[d]					0.53
Never smokers(n=17,692)	0.18±0.05	0.17±0.05	Referent	<0.0001	
Former smokers (n=12,169)	0.06±0.06	0.05±0.06	Referent	0.04	
Current smokers (n=4,186)	0.15±0.15	0.12±0.16	Referent	0.11	
Women, by menopausal status[d]					0.04
Premenopausal (n=9,821)	0.19±0.13	0.08±0.13	Referent	0.03	
Postmenopausal (n=17,762)	0.12±0.04	0.12±0.04	Referent	<0.0001	

[a] Mean difference in weight ±SD, kg, compared with the referent group.

[b] Interval during which weight change was assessed, mean ±SD = 2.88±0.41 yr.

[c] See footnote to Table 1 regarding physical activity levels.

[d] Model 1 adjusted for age, baseline weight, height, and time interval between weight assessments; model 2 additionally adjusted for race, education, smoking, menopausal status, hormone replacement therapy, hypertension, diabetes, alcohol consumption, and quintiles of intakes of total energy, saturated fat, and fruits and vegetables. Analyses according to subgroups of women all used estimates from Model 2.

[e] Number of women in the group at baseline.

Table 3

Odds Ratios (95% Confidence Interval)[a] for Weight Gain of ≥2.3 Kilograms over Any 3-Year Period,[b] According to Physical Activity Level,[c] Women's Health Study, 1992–2007

	Physical Activity (MET-Hr/Week)				
Group	**<7.5**	**7.5–<21**	**≥21**	**P, Trend**	**P, Interaction**
All women (n=34,079)	1.11 (1.07–1.14)	1.07 (1.04–1.11)	Referent	<0.0001	--
Women, by age:					0.51
<55 yr (n=21,363)[d]	1.08 (1.02–1.14)	1.05 (0.99–1.11)	Referent	0.005	
55 – 64 yr (n=9,699)	1.14 (1.09–1.20)	1.12 (1.07–1.17)	Referent	<0.0001	
≥65 yr (n=3,017)	1.07 (1.00–1.15)	1.03 (0.96–1.10)	Referent	0.054	
Women, by BMI					<0.0001
<25.0 kg/m^2(n=17,475)	1.14 (1.09–1.20)	1.08 (1.03–1.13)	Referent	<0.0001	
25 – 29.9 kg/m^2(n=10,516)	1.04 (0.99–1.10)	1.01 (0.96–1.07)	Referent	0.13	
≥30.0 kg/m^2(n=6,088)	1.04 (0.97–1.12)	1.05 (0.97–1.14)	Referent	0.37	
Women, by smoking status					0.69
Never smokers(n=17,692)	1.13 (1.08–1.18)	1.10 (1.05–1.15)	Referent	<0.0001	
Former smokers (n=12,169)	1.09 (1.03–1.14)	1.06 (1.01–1.11)	Referent	0.0009	
Current smokers (n=4,186)	1.07 (0.96–1.18)	1.04 (0.92–1.17)	Referent	0.23	
Women, by menopausal status					0.50
Premenopausal (n=9,821)	1.10 (1.01–1.21)	1.02 (0.93–1.12)	Referent	0.03	
Postmenopausal (n=17,762)	1.11 (1.08–1.15)	1.08 (1.05–1.13)	Referent	<0.0001	

[a] Adjusted for age, baseline weight, height, time interval between weight assessments, race, education, smoking, menopausal status, hormone replacement therapy, hypertension, diabetes, alcohol consumption, and quintiles of intakes of total energy, saturated fat, and fruits and vegetables.

[b] Interval during which weight change was assessed, mean ±SD = 2.88±0.41 yr.

[c] See footnote to Table 1 regarding physical activity levels.

[d] Number of women in the group at baseline.