

Obesity Treatment The Role of Physical Activity

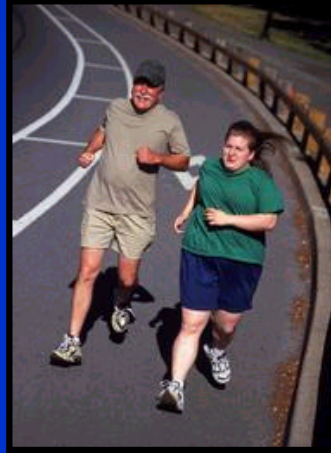
**North American Association for the
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Obesity treatment: the role of physical activity

Benefits of Regular Physical Activity in Obese Persons

- Decreases loss of fat-free mass associated with weight loss
- Improves maintenance of weight loss
- Improves cardiovascular and metabolic health, independent of weight loss



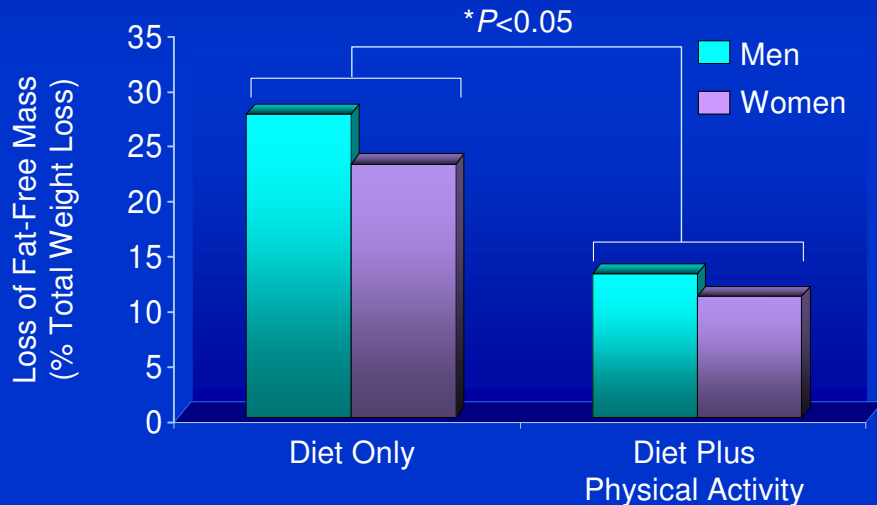
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Benefits of regular physical activity in obese persons

Regular physical activity is an important component of any weight loss program because it is associated with long-term weight maintenance and has beneficial health effects, such as decreasing coronary heart disease and diabetes, that are independent of weight loss itself. The important physiological and clinical issues regarding the use of physical activity as part of obesity therapy will be reviewed in this section.

Keywords: physical activity, cardiovascular health, metabolic health, coronary heart disease, type 2 diabetes mellitus

Physical Activity Helps Preserve Fat-Free Mass During Weight Loss



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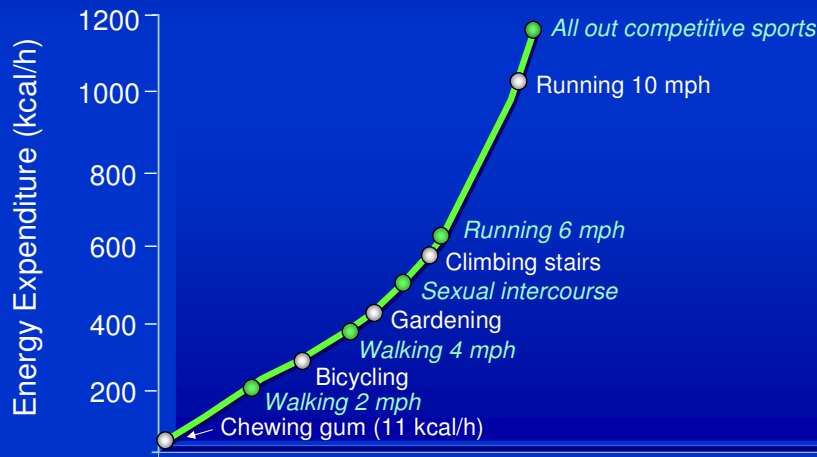
Physical activity helps preserve fat-free mass during weight loss

Approximately 75% of weight that is lost by dieting is composed of fat and 25% is fat-free mass (FFM) [1]. Adding a physical activity program to dietary therapy can affect the composition of weight loss. Two meta-analyses that pooled data from 46 [1] and 28 [2] published trials found that exercise can attenuate the loss of FFM. In subjects with a mean weight loss of 10 kg, regular exercise decreased the percentage of weight lost as FFM by half, from approximately 28% to 13% in men and from 24% to 11% in women ($P<0.05$). However, this large difference in percentage of weight lost as FFM represented only a small (approximately 1 kg) difference in the absolute amount of FFM lost between groups. Moreover, conservation of FFM does not necessarily represent conservation of muscle protein; the greater retention of FFM associated with exercise may be related to increased retention of body water and muscle glycogen. It is not known whether performing resistance exercise while dieting leads to greater conservation of FFM than performing endurance exercise because of limited and conflicting data [3,4].

1. Ballor DL, Poehlman ET. Exercise-training enhances fat-free mass preservation during diet-induced weight loss: a meta-analytical finding. *Int J Obes Relat Metab Disord* 1994;18:35-40.
2. Garrow JS, Summerbell CD. Meta-analysis: effect of exercise, with or without dieting, on the body composition of overweight subjects. *Eur J Clin Nutr* 1995;49:1-10.
3. Wadden TA, Vogt RA, Anderson RE, et al. Exercise in the treatment of obesity: effects of four interventions on body composition, resting energy expenditure, appetite and mood. *J Consult Clin Psychol* 1997;65:269-277.
4. Geliebter A, Maher MM, Gerace L, et al. Effects of strength or aerobic training on body composition, resting metabolic rate, and peak oxygen consumption in obese dieting subjects. *Am J Clin Nutr* 1997;66:557-563.

Keywords: physical activity, fat-free mass, FFM, weight loss

Energy Expenditure of Physical Activity



Adapted from: Alpers. Undergraduate Teaching Project. Nutrition: energy and protein. American Gastroenterological Association, 1978.

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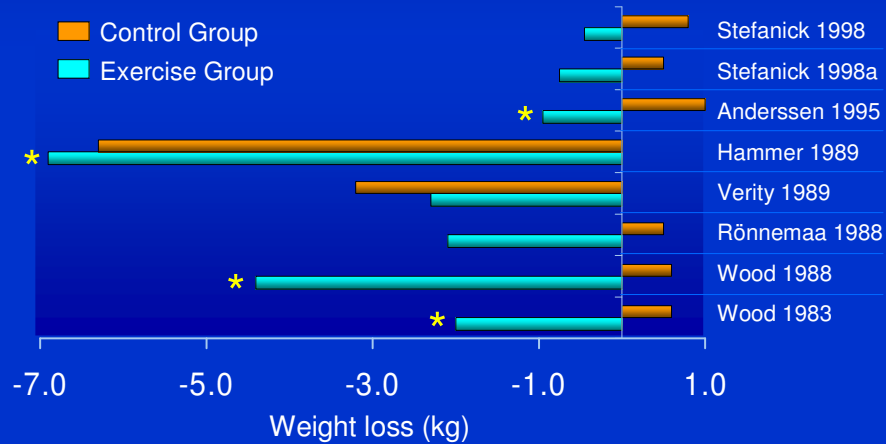
Energy expenditure of physical activity

Physical activity increases metabolic rate. This figure shows the energy expended by selected activities in a 75 kg man. The amount of energy expended depends on the intensity, muscle group involvement, and duration of the activity. The increase in energy consumption associated with an activity occurs primarily during the activity itself. Energy expenditure is also slightly increased after an exercise bout is completed, but the post-exercise increase in metabolic rate is usually short-lived and does not cause an increase in resting energy expenditure the following day.

1. Alpers DH. Undergraduate Teaching Project. Unit XIII A. Nutrition: energy and protein. American Gastroenterological Association, 1978.
2. Levine J, Baukol P, Ioannis P. The energy expended in chewing gum. *N Engl J Med* 1999;341:2100.

Keywords: energy expenditure, resting energy expenditure, physical activity, metabolic rate

Physical Activity Alone Results in Minimal Weight Loss



* $P < 0.05$ vs control group

Duration of each study ranged from 4 to 12 months.

Wing. *Med Sci Sports Exerc* 1999;31(suppl):S547.

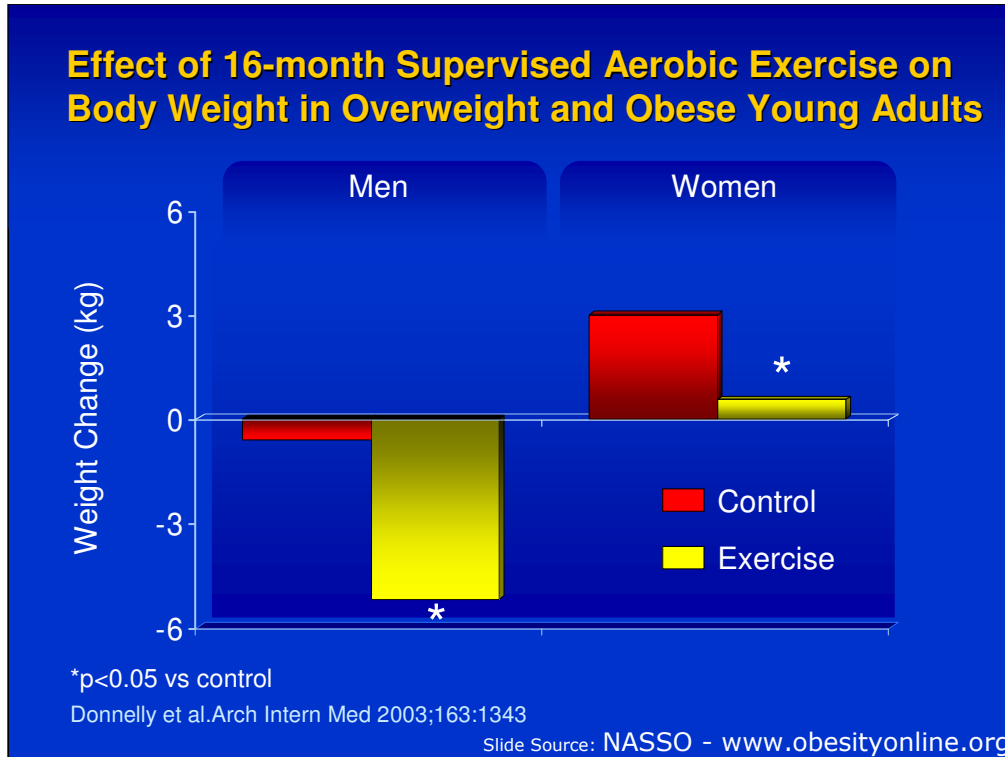
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Physical activity alone results in minimal weight loss

Exercise alone, without concomitant dietary therapy, produces minimal weight loss. The results from most studies have demonstrated that participating in regular endurance exercise activities (eg, brisk walking for 45–60 min, 4 times weekly) for up to a year without an energy-restricted diet, usually results in minimal weight loss (an average 2-kg decrease in body weight compared with a control group) [1-8]. Moreover, it is not known whether weight loss was due to exercise alone or whether the participants also altered their dietary intake because they were enrolled in an exercise program. In addition, these data may not represent the effect of exercise in obese persons because most subjects enrolled in these studies were slightly overweight men. Vigorous exercise training causes much greater losses in body weight when energy intake is held constant [9].

1. Wing RR. Physical activity in the treatment of the adulthood overweight and obesity: current evidence and research issues. *Med Sci Sports Exerc* 1999;31(suppl):S547-S552.
2. Anderssen S, Holme I, Urdal P, Hjermann I. Diet and exercise intervention have favourable effects on blood pressure in mild hypertensives: the Oslo Diet and Exercise Study (ODES). *Blood Press* 1995;4:343-349.
3. Hammer RL, Barrier CA, Roundy ES, et al. Calorie-restricted low-fat diet and exercise in obese women. *Am J Clin Nutr* 1989;49:77-85.
4. Rönnemaa T, Marniemi J, Puukka P, Kuusi T. Effects of long-term physical exercise on serum lipids, lipoproteins, and lipid metabolizing enzymes in type 2 (non-insulin-dependent) diabetic patients. *Diabetes Res* 1988;7:79-84.
5. Stefanick ML, Mackey S, Sheehan M, et al. Effects of the NCEP Step 2 diet and exercise on lipoprotein in postmenopausal women and men with low high density lipoprotein (HDL)-cholesterol and high low density lipoprotein (LDL)-cholesterol. *N Engl J Med* 1998;329:12-20.
6. Verity LS, Ismail AH. Effects of exercise on cardiovascular disease risk in women with NIDDM. *Diabetes Res Clin Pract* 1989;6:27-35.
7. Wood PD, Haskell WL, Blair SN, et al. Increased exercise level and plasma lipoprotein concentrations: a one-year, randomized, controlled study in sedentary, middle-aged men. *Metabolism* 1983;32:31-37.
8. Wood PD, Stefanick ML, Dreon DM, et al. Changes in plasma lipids and lipoproteins in overweight men during weight loss through dieting as compared with exercise. *N Engl J Med* 1988;319:1173-1179.
9. Bouchard C, Tremblay AJ, Nadeau A, et al. Long-term exercise training with constant energy intake: effect on body composition and selected metabolic variables. *Int J Obes* 1990;14:57-73.

Keywords: physical activity, energy intake, exercise training



Effect of 16-month supervised aerobic exercise on body weight in overweight and obese young adults

An carefully supervised aggressive exercise program may have greater effects on body weight than less rigorous exercise. This figure shows the results of a 16-month study that randomized 131 sedentary young adult men and women (average age 23 years old; range 17-35 years old) who were overweight and obese (average BMI 29 kg/m²; range 25.0-34.9 kg/m²) to either a control or exercise group [1]. The exercise group participated in supervised aerobic exercise performed at moderate intensity (55%-70% of their maximal oxygen consumption) during 45 minute sessions, 5 days/week for 16 months. The data are from those subjects who completed the entire 16-month study, representing 75% of the control group and 47% of the exercise group. Men and women randomized to exercise who completed the study, completed approximately 90% of the exercise sessions. By the end of the study, men were expending about 3300 kcal/wk and women about 2200 kcal/wk from supervised exercise. Exercise did not change total energy intake or dietary macronutrient composition [2]. These data demonstrate that 16 months of moderate intensity aerobic exercise for 45 min/day, 5 days/wk causes weight loss in young men and prevents weight gain in young women.

1. Donnelly JE, Hill JO, Jacobsen DJ et al. Effects of 16-month randomized controlled exercise trial on body weight and composition in young, overweight men and women. Arch Intern Med 2003;163:1343-1350.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=12796071

2. Donnelly JE, Kirk EP, Jacobsen DJ et al. Effects of 16-mo of verified, supervised aerobic exercise on macronutrient intake in overweight men and women: the Midwest Exercise Trial Am J Clin Nutr 2003;78:950-956.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=14594781

Physical Activity Usually Does Not Increase Short-Term Diet-Induced Weight Loss



* $P < 0.05$ vs diet-only group.

Each study ranged from 4 to 6 months.

Wing RR. *Med Sci Sports Exerc.* 1999;31(suppl):S547-S552.

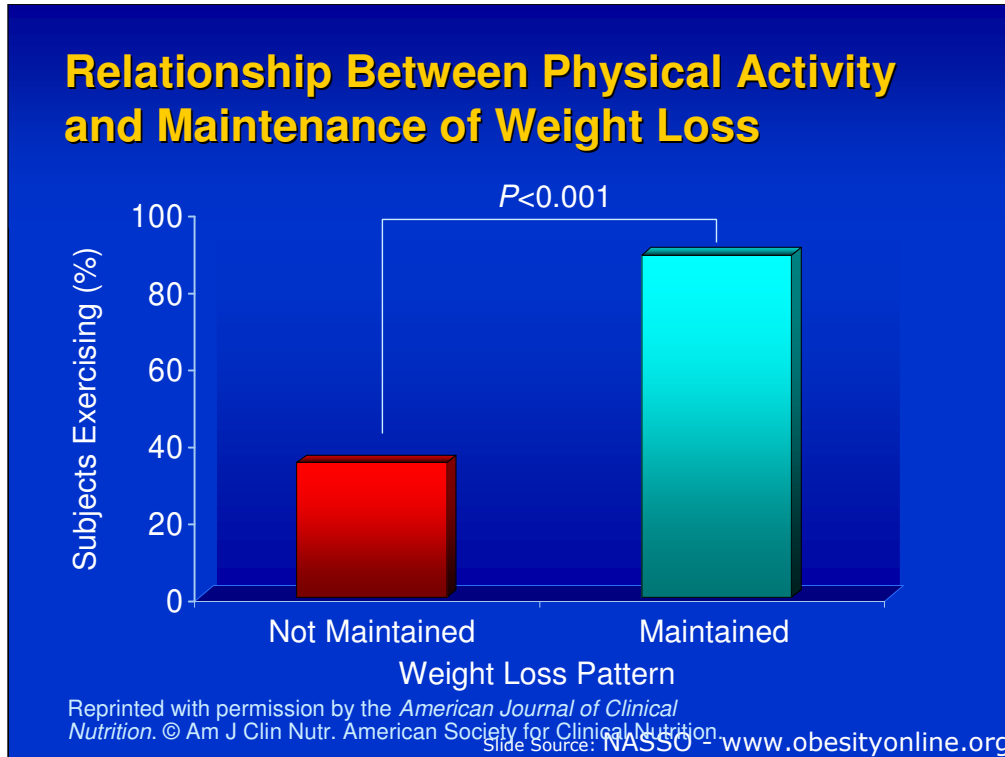
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Physical activity usually does not increase short-term diet-induced weight loss

Data from randomized controlled studies suggest that adding exercise to dietary therapy does not significantly increase short-term weight loss compared with dietary therapy alone [1]. This figure shows the results from 6 studies that compared short-term (4-6 months) diet therapy alone with diet therapy plus exercise [2-8]. Only one study found a statistically significant, but small, improvement in weight loss with diet therapy plus exercise than with diet therapy alone [3].

1. Wing RR. Physical activity in the treatment of the adulthood overweight and obesity: current evidence and research issues. *Med Sci Sports Exerc.* 1999;31(suppl):S547-S552.
2. Bertram SR, Venter I, Stewart RI. Weight loss in obese women: exercise vs. dietary education. *S Afr Med J.* 1990;78:15-18.
3. Blonk MC, Jacobs MA, Biesheuvel EH, et al. Influences on weight loss in type 2 diabetic patients: little long-term benefit from group behaviour therapy and exercise training. *Diabetic Med.* 1994;11:449-457.
4. Marks BL, Ward A, Morris DH, et al. Fat-free mass is maintained in women following a moderate diet and exercise program. *Med Sci Sports Exerc.* 1995;27:1243-1251.
5. Ross R, Pedwell H, Rissanen J. Effects of energy restriction and exercise on skeletal muscle and adipose tissue in women as measured by magnetic resonance imaging (MRI). *Am J Clin Nutr.* 1995;61:1179-1185.
6. Ross R, Rissanen J, Pedwell H, et al. Influence of diet and exercise on skeletal muscle and visceral adipose tissue in men. *J Appl Physiol.* 1996;81:2445-2455.
7. Sweeney ME, Hill JO, Heller PA, et al. Severe vs moderate energy restriction with and without exercise in the treatment of obesity: efficiency of weight loss. *Am J Clin Nutr.* 1993;57:127-134.
8. Wadden TA, Vogt RA, Andersen RE, et al. Exercise in the treatment of obesity: effects of four interventions on body composition, resting energy expenditure, appetite, and mood. *J Consult Clin Psychol.* 1997;65:269-277.

Keywords: physical activity, diet-induced weight loss



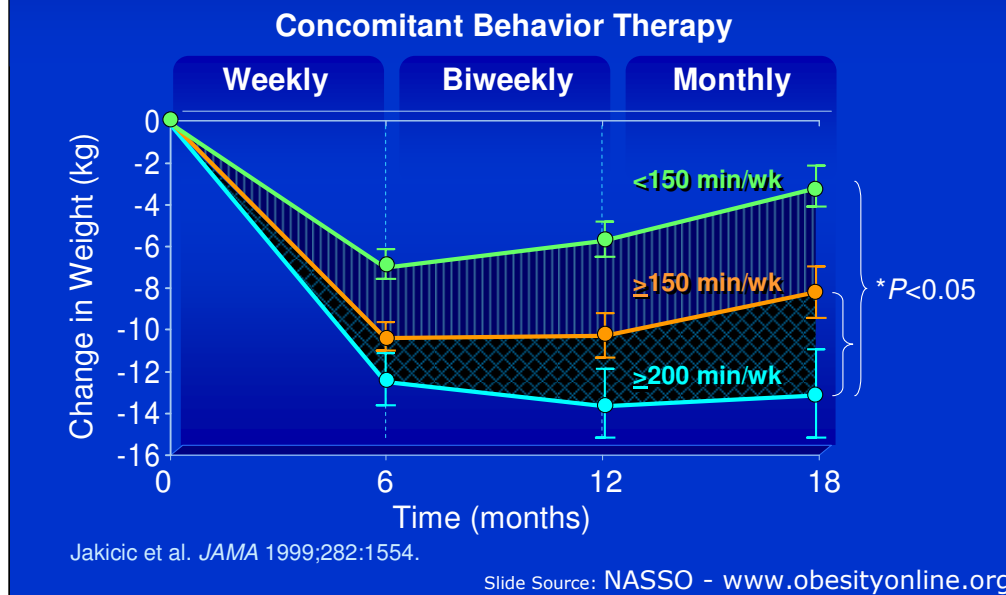
Relationship between physical activity and maintenance of weight loss

Although increasing physical activity may not improve short-term weight loss, physical activity may be very important for long-term weight management. However, most long-term (>10 months) prospective randomized controlled trials have not demonstrated a statistically significant beneficial effect of exercise on body weight, when data were analyzed on an intention-to-treat basis [1,2]. The failure to detect a beneficial effect of exercise on body weight may be related to poor compliance with an exercise program. However, large cross-sectional case studies and retrospective analyses of prospective trials found that successful long-term (>1 y) weight loss was associated with participation in regular exercise [3-6]. This figure shows data from one study that found 90% of formerly obese women who achieved and maintained average weight exercised regularly, compared with 34% of obese women who regained weight after successful weight loss ($P < 0.001$) [3].

1. Wadden TA, Vogt RA, Anderson RE, et al. Exercise in the treatment of obesity: effects of four interventions on body composition, resting energy expenditure, appetite and mood. *J Consult Clin Psychol* 1997;65:269-277.
2. Jeffery RW, Wing RR, Thorson C, Burton LR. Use of personal trainers and financial incentives to increase exercise in a behavioral weight loss program. *J Consult Clin Psychol* 1998;66:777-783.
3. Kayman S, Bruvold W, Stern JS. Maintenance and relapse after weight loss in women: behavioral aspects. *Am J Clin Nutr* 1990;52:800-807.
4. Marston AR, Criss J. Maintenance of successful weight loss: incidence and prediction. *Int J Obes* 1984;8:435-439.
5. Jeffery RW, Bjornson-Benson WM, Rosenthal BS, et al. Correlates of weight loss and its maintenance over two years of follow-up among middle-aged men. *Prev Med* 1984;13:155-168.
6. Hartman WM, Straud M, Sweet DM, Saxton J. Long-term maintenance of weight loss following supplemented fasting. *Int J Eat Disord* 1993;87-93.

Keywords: physical activity, weight loss, weight loss maintenance

Considerable Physical Activity is Necessary for Weight Loss Maintenance

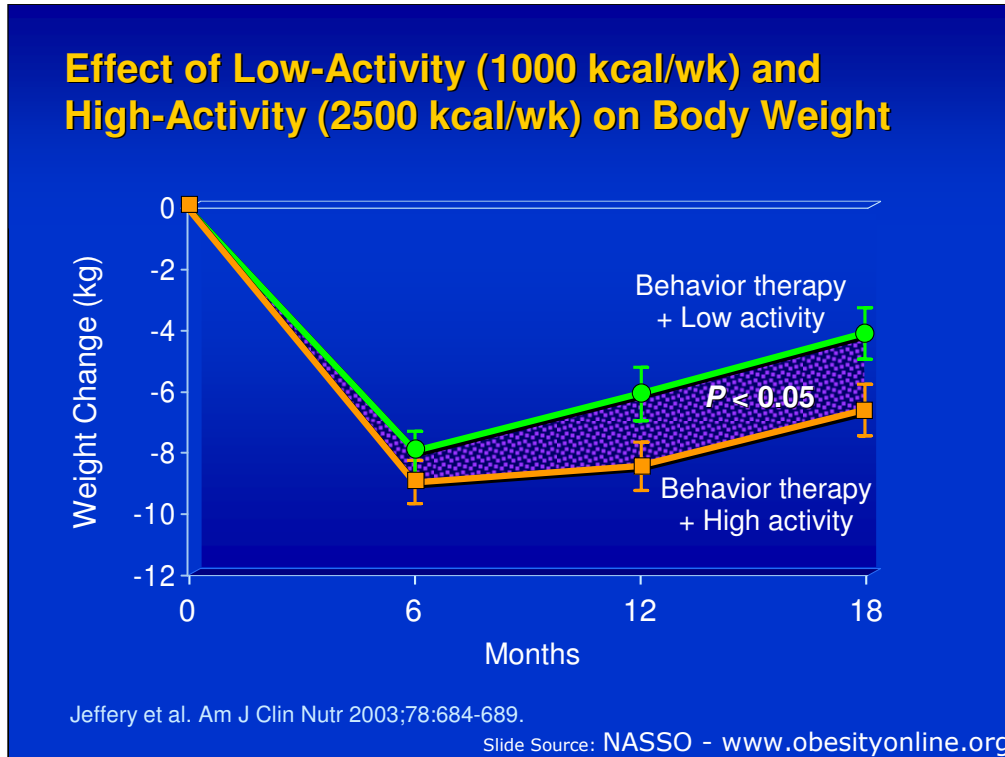


Considerable Physical Activity is Necessary for Weight Loss Maintenance

The amount of physical activity required to maintain weight loss appears to be much greater than that recommended by the American College of Sports Medicine and the Centers for Disease Control and Prevention for good health, (30 minutes of moderate-intensity exercise on most days of the week) [1]. Data from most studies suggest that successful long-term weight maintenance is associated with regular activity that expends approximately 2500 kcal/wk, which is equivalent to moderate activity, such as brisk walking, for approximately 60–75 minutes per day, or vigorous activity, such as aerobics, cycling or jogging, for 30 minutes per day [2-5]. In this figure, data are presented that show a dose-response relationship between amount of exercise per week and change in body weight [3]. At 18 months, weight loss in participants who spent at least 200 minutes per week in physical activity (-13.1 kg) was greater than those exercising for at least 150 minutes per week (-8.5 kg) and those exercising less than 150 minutes per week (-3.5 kg). However, these data represent a retrospective analysis of subjects who chose to exercise at different levels of activity and does not represent those who were randomized to those levels of activity.

1. Pate RR, Pratt M, Blair SN, et al. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 1995;273:402-407.
2. Schoeller DA, Shay K, Kushner RF. How much physical activity is needed to minimize weight gain in previously obese women? *Am J Clin Nutr* 1997;66:551-556.
3. Jakicic JM, Winters C, Lang W, Wing RR. Effects of intermittent exercise and use of home exercise equipment on adherence, weight loss, and fitness in overweight women. *JAMA* 1999;282:1554-1560.
4. Jeffery RW, Wing RR, Thorson C, Burton LR. Use of personal trainers and financial incentives to increase exercise in a behavioral weight loss program. *J Consult Clin Psychol* 1998;66:777-783.
5. Wing RR, Tate DF. Lifestyle changes to reduce obesity. *Curr Opin Endocrinol Diabetes* 2000;7:240-246.

Keywords: physical activity, weight change, weight loss maintenance



Effect of low-activity (1000 kcal/wk) and high-activity (2500 kcal/wk) on body weight

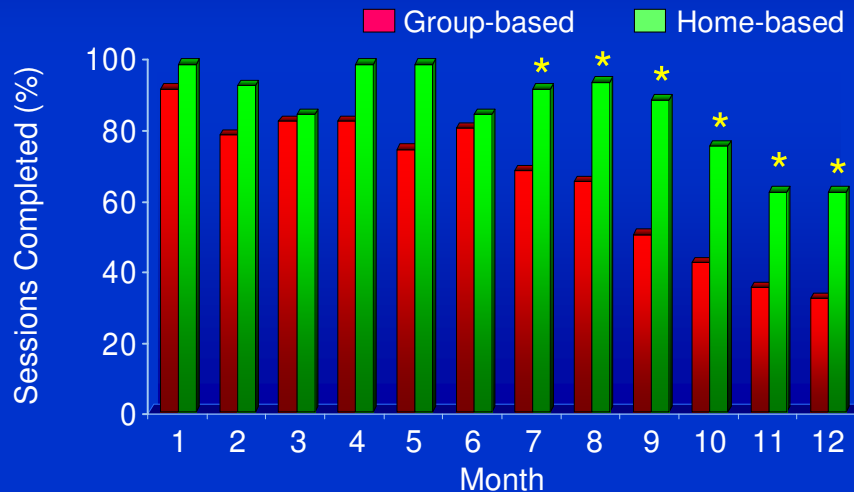
Retrospective analyses of data from weight loss trials have found that a large amount of physical activity (>60 min/day of walking) is associated with maintenance of weight loss in obese subjects who lost weight by dieting. The data shown in this figure are from a randomized controlled trial that evaluated the effect of a low-calorie diet and standard behavior therapy plus either a low (1000 kcal/wk=walking 30 min/day) or a high (2500 kcal/wk=walking 75 min/day) physical activity prescription on body weight [1]. In contrast to data from retrospective analyses, high physical activity did not prevent weight regain. However, weight regain was less in subjects randomized to high than to low physical activity. The high physical activity group also reported more exercise-related injuries than the low physical activity group.

1. Jeffery RW, Wing RR, Sherwood NE, Tate DF. Physical activity and weight loss: does prescribing higher physical activity goals improve outcome? Am J Clin Nutr 2003;78:684-689.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=14522725

Keywords: physical activity, body weight, behavior therapy

Compliance is Greater with Home-Based versus Group-Based Activity



* $P < 0.05$ group-based vs home-based.

Perri et al. *J Consult Clin Psychol* 1997;65:278. Copyright 1997 by the American Psychological Association. Reproduced with permission.

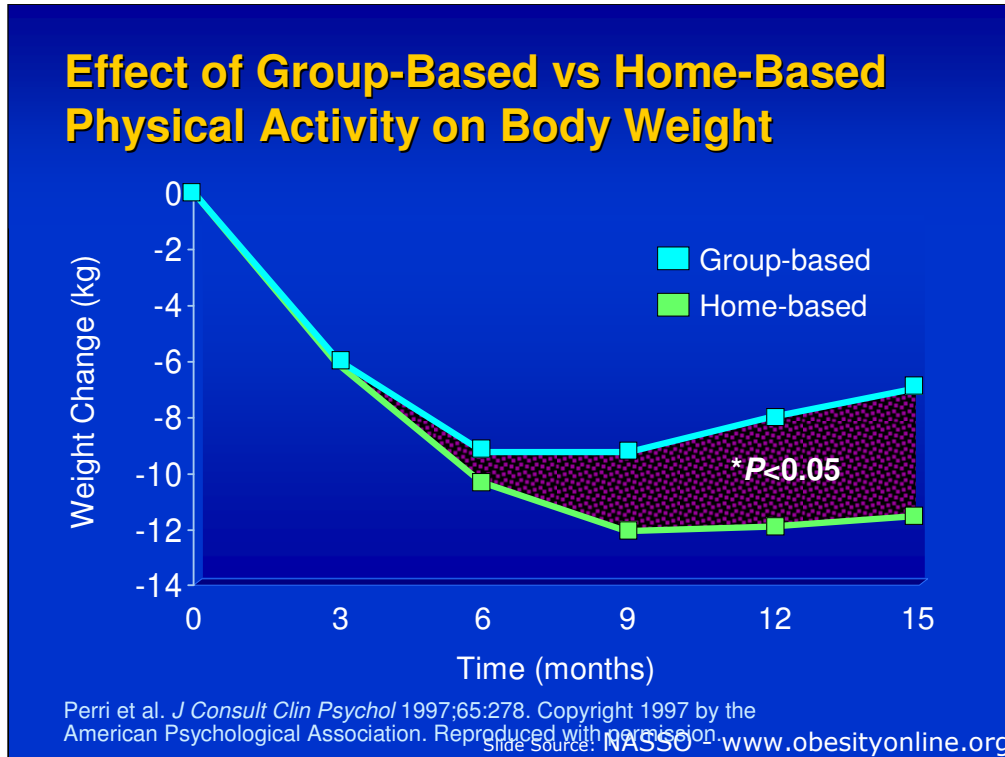
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Compliance is greater with home-based versus group-based activity

Exercising at home, rather than at a health club, can improve adherence to a physical activity regimen because home exercise is associated with fewer barriers, including costs and travel time. Data from several prospective randomized trials have demonstrated that adherence to a walking program [1-3] is better at 1 and 2 years in subjects who were assigned to walk at home compared with those who were randomized to a supervised on-site program. The data in this figure demonstrate that subjects who exercised at home completed a greater percentage of their exercise sessions, particularly in the latter half of the year, than those randomized to participate in a group exercise program [3].

1. Jakicic JM, Wing RR, Winters D. Effects of intermittent exercise and use of home exercise equipment on adherence, weight loss, and fitness in overweight women. *JAMA* 1999;282:1554-1560.
2. King AC, Haskell WL, Young DR, et al. Long-term effects of varying intensities and formats of physical activity on participation rates, fitness, and lipoproteins in men and women aged 50-65 years. *Circulation* 1995;91:2596-2604.
3. Perri MG, Martin AD, Leermakers EA, Sears SF. Effects of group- versus home-based exercise training in healthy older men and women. *J Consult Clin Psychol* 1997;65:278-285.

Keywords: compliance, home-based physical activity, group-based physical activity



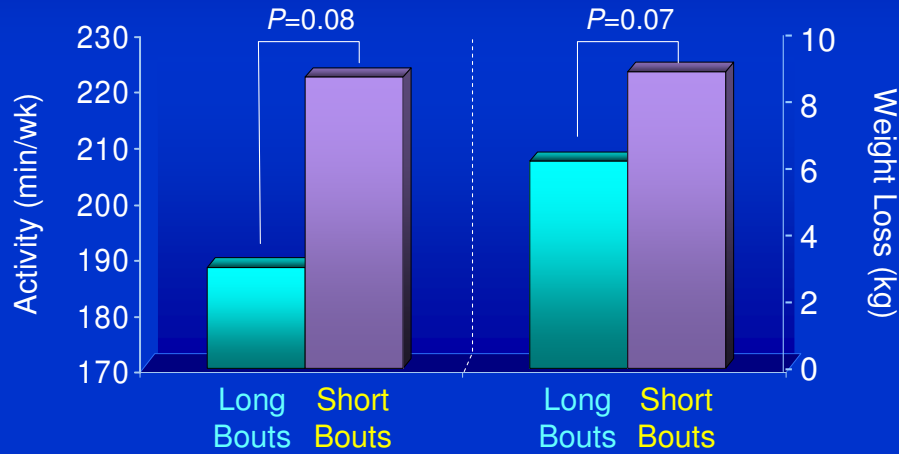
Effect of group-based vs home-based physical activity on body weight

A home-based physical activity program can help obese persons achieve greater long-term weight loss than group-based programs, presumably because of increased compliance with home-based programs. In this study, Perri et al [1] found that obese subjects randomized to participate in home-based exercise lost more weight over 15 months than those randomized to participate in a similar exercise program that was group-based (11.65 kg vs 7.01 kg, $P=0.05$).

1. Perri MG, Martin AD, Leermakers EA, Sears SF. Effects of group- versus home-based exercise training in healthy older men and women. *J Consult Clin Psychol* 1997;65:278-285.

Keywords: home-based physical activity, group-based physical activity, weight change

Effect of Long vs Short Bouts of Exercise on Total Amount of Activity and Weight Loss



Long bout = one 40-min session.
Short bout = four 10-min sessions.

Jakicic et al. *J Obes Relat Metab Disord* 1995;19:893.

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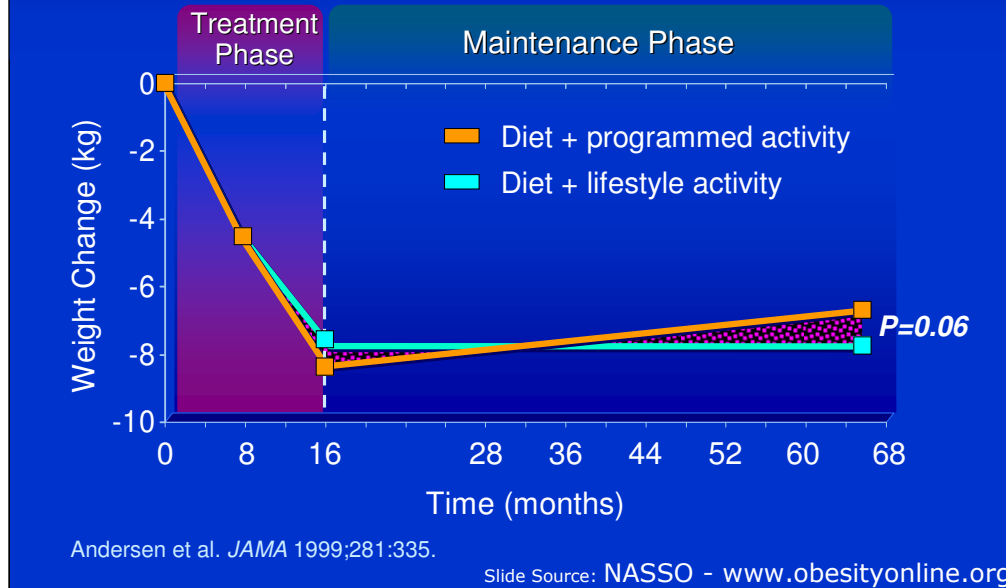
Effect of long vs short bouts of exercise on total amount of activity and weight loss

Dividing one long bout of exercise into several shorter bouts can improve patients' adherence to programmed activity. This figure shows the results of a prospective trial that randomized obese women to four short (10-minute) bouts of exercise 5 days weekly, or one long (40-minute) bout of exercise 5 days weekly, for 20 weeks [1]. The recommended caloric intake was the same in both groups, 1200–1500 kcal/d. The group who participated in multiple short bouts of exercise reported greater adherence to exercise; they exercised on a greater number of days per week ($P<0.05$) and for a greater total duration ($P=0.08$). Moreover, there was a trend toward greater weight loss in the short-bout group compared with the long-bout group (8.9 kg vs 6.4 kg, $P<0.07$).

1. Jakicic JM, Wing RR, Butler BA, Robertson RJ. Prescribing exercise in multiple short bouts versus one continuous bout: effects on adherence, cardiorespiratory fitness, and weight loss in overweight women. *Int J Obes Relat Metab Disord*. 1995 Dec;19(12):893-901.

Keywords: physical activity, duration, weight loss

Weight Maintenance Can Be Achieved with Either Programmed or Lifestyle Activity



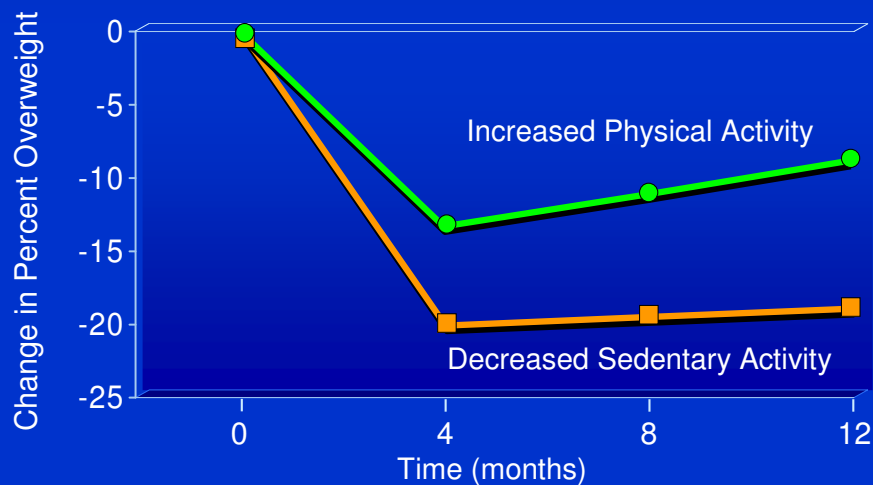
Weight maintenance can be achieved with either programmed or lifestyle activity

Increasing daily lifestyle activities can be just as effective as a structured aerobic exercise program in maintaining long-term weight loss. In this study, obese women were randomized to 16 weeks of treatment with a behavioral therapy program and a 1200 kcal/d diet with either structured aerobic exercise (three 45-minute step aerobics classes weekly) or instructions for increasing moderate-intensity lifestyle activities by 30 minutes per day on most days of the week (e.g. walk instead of drive short distances; take stairs instead of elevators) [1]. After the 16-week treatment phase was completed, subjects attended 4 follow-up meetings (every 13 weeks) for 1 year. The figure shows that initial weight loss was similar in both groups at 16 weeks (8.3 kg in the programmed group vs 7.9 kg in the lifestyle group, $P=0.08$) and a trend toward better maintenance of weight loss at 68 weeks in the lifestyle activity participants than in the group that received programmed exercise ($P=0.06$). These findings demonstrate that education to alter lifestyle activities is a reasonable alternative to programmed exercise for obese patients.

1. Andersen RE, Wadden TA, Bartlett SJ, et al. Effects of lifestyle activity vs structured aerobic exercise in obese women: a randomized trial. *JAMA* 1999;281:335-340.

Keywords: programmed activity, lifestyle activity, weight maintenance

Effect of Decreasing Sedentary Activities vs Increasing Physical Activities on Body Weight in Children 6-12 Years Old



Epstein et al. *Health Psychol* 1995;14:109.

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Effect of decreasing sedentary activities vs increasing physical activities on body weight in children 6–12 years old

A strategy of reducing children's sedentary behavior can be more effective than a strategy of promoting physical activity. Epstein and colleagues [1] studied overweight children who underwent a 4-month program in which they learned the Stoplight diet and behavior modification techniques. One group of children received reinforcement for increased physical activity. Another group received reinforcement for reducing the hours spent watching television or other sedentary behavior but not for replacing that time with physical activity. In the group that decreased sedentary behavior, percent overweight declined by an average of 20% compared with less than 15% in the physical activity group. The superior effects were maintained at the 12-month follow-up.

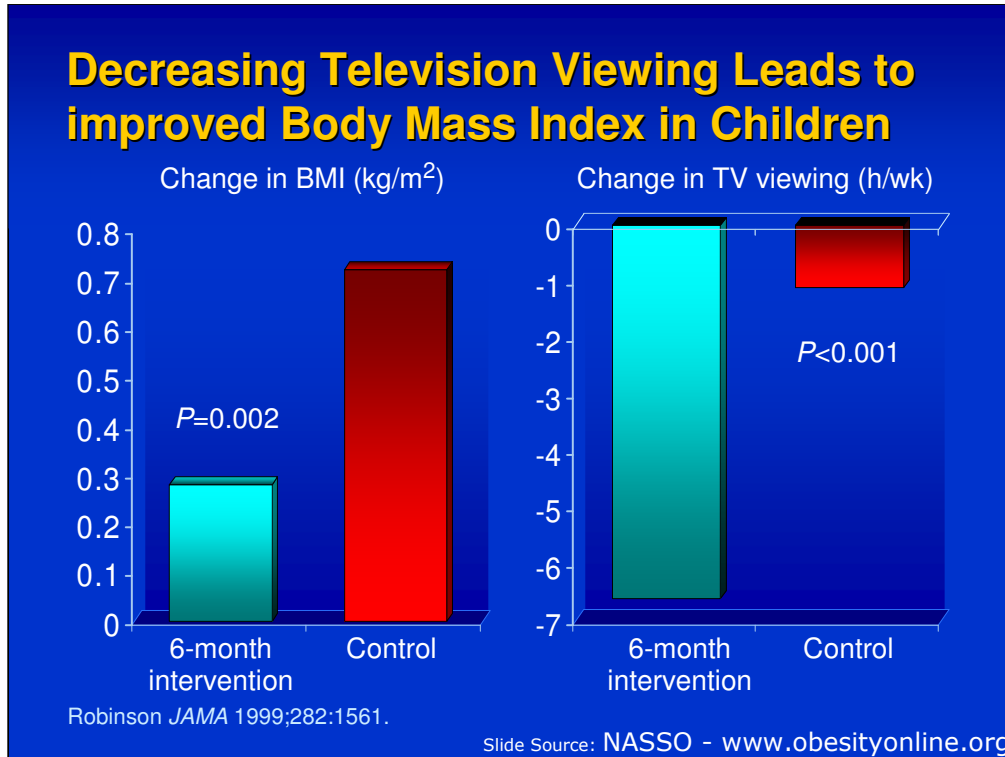
The American Academy of Pediatrics recommends limitation of television viewing to 1 or 2 hours daily [2]. Healthcare providers should advise overweight children and adolescents and their families to stay within this recommended limit.

1. Epstein LH, Valoski AM, Vara LS, et al. Effects of decreasing sedentary behavior and increasing activity on weight change in obese children. *Health Psychology* 1995;14:109-115.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=7789345

2. American Academy of Pediatrics Committee on Communication. Children, adolescents, and television. *Pediatrics* 1995;96:786-787.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=7567350



Decreasing television viewing leads to improved body mass index in children

A program to reduce television viewing among a cohort of normal-weight children demonstrated beneficial effects on body weight [1]. Third and fourth grade students in one school were engaged in a 6-month curriculum that promoted reduction of television viewing. These children were not, as a group, overweight and were not encouraged to change eating habits or to try to lose weight. Third and fourth graders in a different school served as controls. BMI was measured at baseline and at 6 months. Because the BMI of children this age normally increases over time, the investigators examined the change in BMI of the two groups. Compared with the control group, the intervention group successfully reduced television hours and had a smaller increase in BMI.

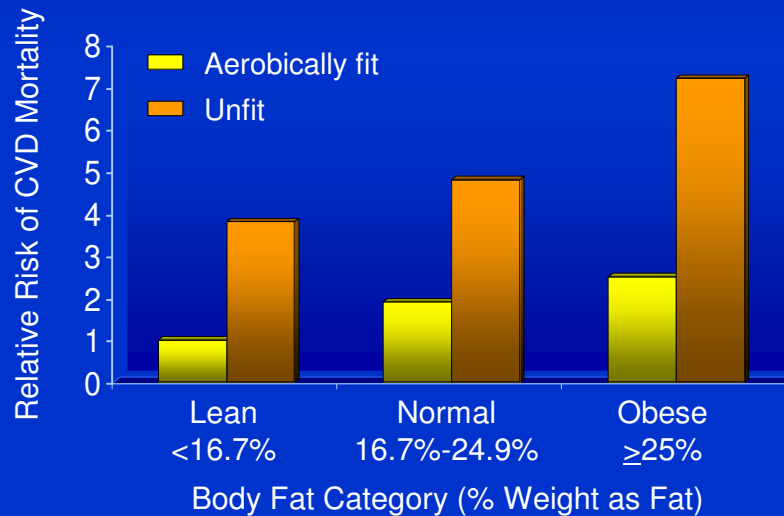
For an overweight child, the improvement in BMI seen in this study may be clinically inadequate, but the results suggest that minimizing television viewing could prevent the development of obesity in some children and help to decrease the high prevalence of pediatric obesity overall.

1. Robinson TN. Reducing children's television viewing to prevent obesity: a randomized controlled trial. JAMA 1999;282:1561-1567.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=10546696

Keywords: television viewing, children, body mass index, BMI

Fatness, Fitness and Cardiovascular Disease Mortality



Lee et al. *Am J Clin Nutr* 1999;69:373.

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Fatness, fitness and cardiovascular disease mortality

In addition to the beneficial effects of physical activity on body weight, aerobic fitness can independently modify the risk of developing cardiovascular disease. This figure illustrates the data obtained from a large observational cohort study involving more than 20,000 men, aged 30 to 83 years, who were followed for an average of 8 years [1]. The results show that increasing adiposity is associated with an increased risk of cardiovascular mortality. However, among each category of body fatness, those who were fit, defined by their maximal ability to consume oxygen during exercise, had a lower incidence of cardiovascular mortality than those who were unfit. Moreover, participants who were obese and fit had a lower risk of cardiovascular death than participants who were lean but unfit. Aerobic fitness, independent of body fatness, also is associated with a decreased risk of developing diabetes [2].

1. Lee CD, Blair SN, Jackson AS. Cardiorespiratory fitness, body composition, and all-cause and cardiovascular disease mortality in men. *Am J Clin Nutr* 1999;69:373-380.
2. Wei M, Gibbons L, Mitchell T, et al. The association between cardiorespiratory fitness and impaired fasting glucose and type 2 diabetes mellitus in men. *Ann Intern Med* 1999;130:89-96.

Keywords: fitness, cardiovascular disease mortality, CVD, relative risk, body fat

Guidelines for Increasing Physical Activity

- Assessment
 - 1) Medical and psychological readiness
 - 2) Physical limitations
 - 3) Current activities
 - 4) Barriers to activity
- Develop physical activity plan
- Start activity slowly and gradually increase planned aerobic activity to 200 min/wk
- Enhance compliance
 - Programmed vs lifestyle activity
 - At-home vs onsite activity
 - Multiple short bouts vs single long bout of activity

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Guidelines for increasing physical activity

This table summarizes practical guidelines that can be used to help obese patients increase their regular physical activity. An initial assessment is needed to determine: 1) the patient's current activity profile, 2) his/her readiness to lose weight, 3) the kinds of activities that are physically possible, and 4) barriers that can prevent a successful increase in activity. From this, clinicians should assist patients in developing a physical activity plan, based on information obtained from the initial assessment. Physical activity should be initiated at a low level and gradually increased to a goal of 200 minutes per week in properly selected patients. Activity compliance can be enhanced by increasing lifestyle activities, developing an appropriate home-based exercise program, and considering short bouts rather than long bouts of activity for patients who "can't find the time to exercise."

Keywords: assessment, physical activity plan, compliance, guidelines

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