I'm just big boned!

Weight as a Factor in Repetitive Strain Injuries

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Edited by Sally Longyear

We can no longer afford to tiptoe around the issue of overweight and obesity. Every year research indicates further health-related problems associated with excess fat, yet doctors and other health practitioners avoid discussing the problem with patients. There is now research backing the observation made many years ago by ergonomists that there is an increased risk of Repetitive Strain Injuries (RSI) in overweight individuals. [1, 2]

Our intention is for this article to be non-judgmental and pragmatic. The terminology associated with excess weight can be very painful, especially when someone is determined to be obese. It is a terrible label, but it is one that is used throughout the research and scientific literature on body fat. If you fall into this range, do not take this terminology personally. Try to accept that you are beyond "pleasingly plump" and that it is time to get *really* serious about weight loss. We hope you can look beyond the terminology as you read this article and understand the reasons we are worried about your health.

I'm not THAT fat!

Do you have a weight problem? Before we discuss the health problems associated with overweight and obesity, you can determine your weight category by using the Body Mass Index (BMI). It is more highly correlated with body fat than any other indicator of height and weight. BMI is calculated by dividing your weight by the square of your height.[2] Use the calculator at http://www.working-well.org/articles/bmi.html, or multiply your weight in pounds by 730, divide that number by your height in inches, and then divide that number by your height in inches again. You can also refer to Table 1 following this article.

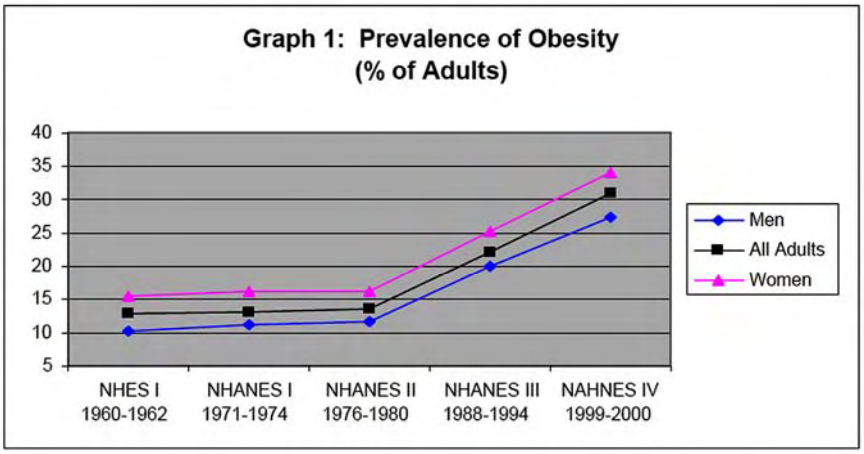
Be aware that this measure is not completely accurate if you are an athlete with more muscle than the average person (note: relatively few people fall into this category). The table may also *underestimate* the amount of body fat in older persons, especially those who enter their height in younger years, but who have "shrunk" due to bone loss.[2]

The accepted BMI ranges are:[2,.3, 4, 5]

Underweight: BMI < 18.5
Normal weight: BMI 18.5 to 24.9
Overweight: BMI 25-29.9
Obese: BMI > 30

Out of Control

Americans spend $33 billion annually on weight-loss products, but statistics show that we are not winning the battle of the bulge.[2,4] People in the U.S. have lost control of their weight within the last 20 years. Two-thirds of adults are overweight (BMI>25) and nearly one-third are obese (BMI>30). According to the Centers of Disease Control and Prevention, obesity is rapidly overtaking smoking as the leading cause of preventable deaths.[5]

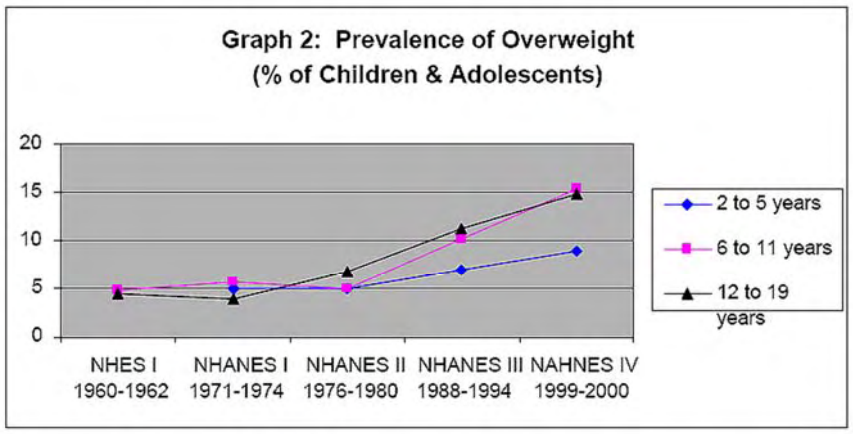


Graph 1: Prevalence of obesity among adults. Percentage of adults aged 20-74 who were classified as obese (body mass index ≥ 30.0 kg/m²) in the National Health Examination Survey 1 (NHES1) and in four National Health and Nutrition Examination Surveys (NHANES).

Illustration courtesy of Reference 2

Clearly, weight is a battle for most Americans. Very few people are spared the difficult process of controlling their food input, exercising when they don't want to, and dealing with the consequences of too many cookies, lattes, and supersized plates of pasta. If proper diet and exercise are not a natural part of your lifestyle and you are heavier than you should be, it is a challenge, but definitely not impossible, to change your habits. Sooner is better than later, since the heavier you become, the more hopeless the situation seems and health problems can start interfering with your ability to exercise.

Roughly 15% of children aged 6-19 are overweight and another 15% are at risk for being overweight based on their BMI.[2,4] Sadly, even 10% of children ages 2-5 are overweight, up from 7% just a decade ago.[4] If children start life overweight, it is difficult for them to change their dietary and exercise habits later on, predisposing them to a lifetime struggle or a lost battle with their weight. Current research indicates that a child born in the U.S. today has a shortened life expectancy 2 to 5 years based on medical consequences of obesity.[2]



Graph 2: Prevalence of obesity among children and adolescents. Percentage of children aged 2-5, 6-11, and adolescents 12-19, who were classified as overweight (95th percentile of body mass index for age according to the 2000 Center for Disease Control growth charts) in the National Health Examination Survey 1 (NHES1) and in four National Health and Nutrition Examination Surveys (NHANES)

Illustration Courtesy of Reference 2

It's not my fault!
"Genes do play a role in how your body burns calories and stores fat, and therefore help determine your susceptibility to becoming overweight or obese," says, Thomas Wadden, PhD, president of ANNSO, the obesity society, the leading scientific organization dedicated to the study of obesity, and the director of the Center for Weight and Eating Disorders at the University of Pennsylvania School of Medicine. Yet a bigger culprit than our chromosomes, say experts, is our behavior, specifically the unhealthy lifestyle choices we make. [5]

Health Problems Associated With Excess Weight
Repetitive Strain Injuries/Cumulative Trauma Disorders. Data collected by the World Health Organization and by Atlas Ergonomics clearly show that weight is a strong factor in developing RSI.[1, 2] Research also shows that a higher total daily sitting time is associated with a 68% increase in the odds of having a BMI over 25.[6] Another study found that 26% of extremely obese men (BMI 35 or over) and 21.7% of extremely obese women reported personal injuries. This is in contrast to normal weight men reporting about 17% and normal weight women reporting 12% injuries. The most common causes of non-fatal injuries among obese and extremely obese people in this study was overexertion and falls.[6]

Atlas Ergonomics analyzed 913 people working in a call center. The data showed that discomfort increased as BMI increased.[2]

Levels of weight are:

Normal Weight: BMI 18.5 to 24.9
Overweight: BMI 25 to 29.9
Class 1 Obese: BMI 30 to 34.9
Class 2 Obese: BMI 35 to 39.9
Class 3 Obese: BMI 40 or greater

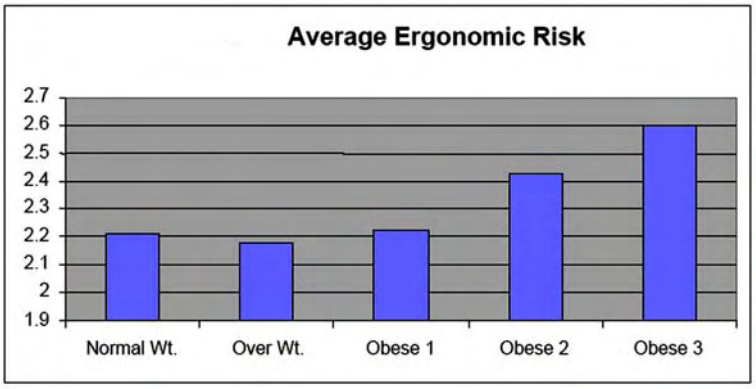
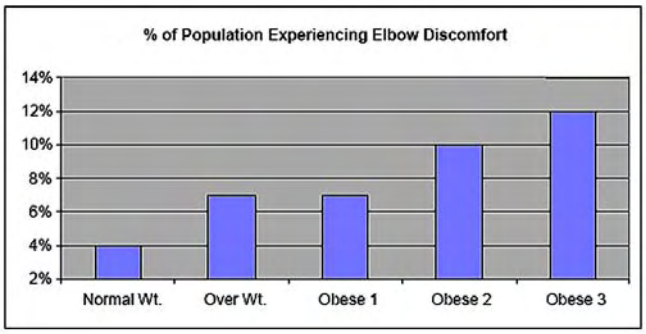
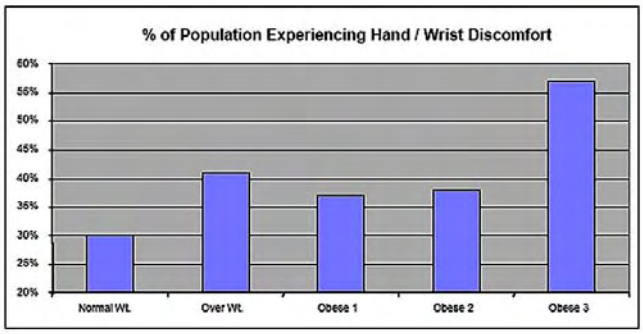


Illustration Courtesy of Reference 2

The following graphs show the dramatic increase in problems experienced by overweight workers with regard to discomfort experienced in the elbow, hand and wrist.

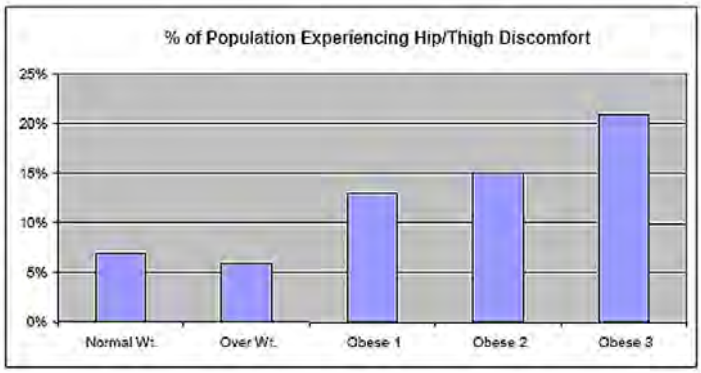


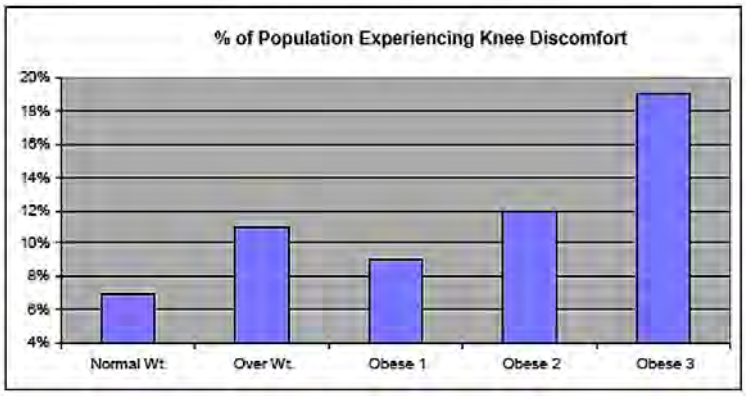


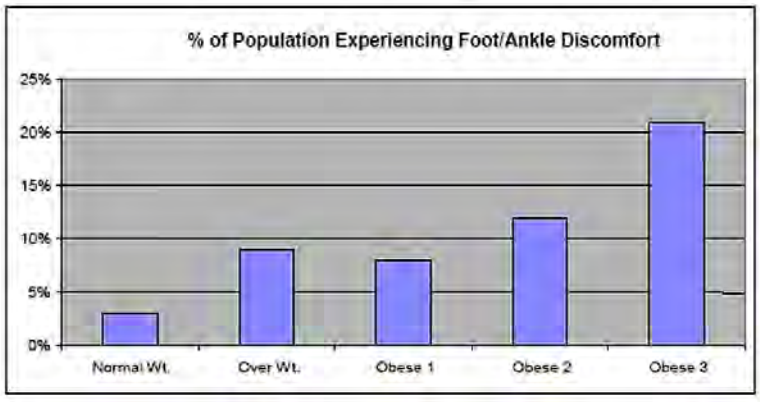
Illustrations Courtesy of Rererence 2

Structural load problems. Some of the most obvious health problems associated with being overweight are a result of the extra burden placed on the structure of the body. Research has shown that low back discomfort and arthritis is more prevalent in the overweight population.

The graphs below show a much greater percentage of problems experienced in the lower body by overweight and obese people.







Illustrations Courtesy of Reference 2

Low back discomfort. Obesity causes increased weight on the spine. Pressure on the discs often causes back pain.[7] A major reason for this pressure is the fact that people who sit most of the day have inadequate back support due to inappropriate chair structure and minimal adjustments. Overweight and obese people need additional features that are not available in standard chairs.

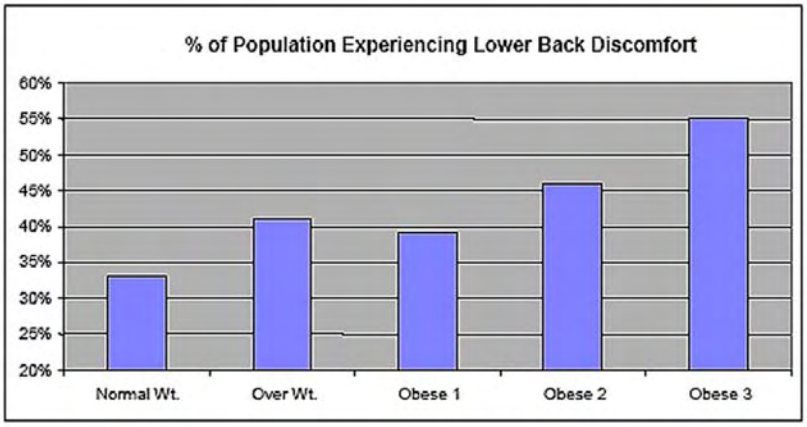


Illustration Courtesy of 2

Arthritis. The risk of osteoarthritis increases in overweight and obese people due to the extra pressure on joints in the lower body, knees, hips, ankles and lower back. Cartilage and cushioning that normally protects the joints wears away with this pressure.[8]

Internal diseases. Health problems associated with being overweight include heart disease, high blood pressure, stroke, diabetes, certain types of cancer, gout (joint pain caused by excess uric acid), and gallbladder disease. [1] Diabetes and gout have been directly correlated with RSI.

Overweight people are twice as likely to develop type 2 diabetes compared to normal-weight people.[8] In overweight women, cancers of the uterus, gallbladder, cervix, ovary, breast, and colon are more prevalent. Overweight men are more likely to develop cancer of the colon, rectum, and prostate.[8] It's not clear whether these cancers are due to extra weight or due to a high-fat and high-calorie diet.[8] Being overweight can also cause problems such as sleep apnea, asthma, and thyroid problems that have also been identified as a contributing factor for RSI. [1,8]

Increased inflammatory response. Researchers have found that human fat cells actually produce C-reactive protein (CRP) that is linked to both inflammation and an increased risk of heart disease and stroke.[9] As stated in our articles on inflammation (http://working-well.org/articles/archive.html#inflammation), inflammation is the cause of nerve compression experienced with Cumulative Trauma Disorders (also known as Repetitive Strain Injuries).

Body fat has lately been regarded as a separate organ, capable of creating CRP and the hormone resistin, which is linked to insulin resistance and the development of type two diabetes. This hormone can stimulate the production of CRP. The whole interactive mechanism is not yet understood, but clearly fat itself appears to be detrimental in dealing with inflammation and conditions likely leading to diabetes.[9] This research also found that both aspirin and statin drugs, commonly used to treat heart disease, effectively reduce production of CRP from fat cells.[9] Red rice yeast, a natural source of statins with fewer side effects than aspirin or prescription drugs, may have a similar effect, but this has not been studied in any research.[10] Statin drugs and red rice yeast can suppress the body's production of heart-healthy Coenzyme Q10, so supplement the diet with CoQ10 daily.[10]

Obesity and Mental Health

Most research has not shown a clear association between mental health and weight, and the American Psychiatric Association has never considered overeating or excess weight a psychiatric problem.[11] However, some research indicates that depressed persons are more likely to develop a

metabolic syndrome that can accompany excess weight, especially when it's concentrated around the waist.[11] People may resort to emotional eating when they are anxious, lonely, angry, or have low self-esteem.[11] Emotional eating often leads to overeating "comfort foods" that are high in fat, sugar, and calories.[11]

The health problems that result from obesity are often a source of anxiety and depression.[11]

Ergonomic Considerations for an Overweight Society
Manufacturers and ergonomists need to help the overweight population with the challenges their size presents and to help them create working environments that do not cause further injury.

Due to body width, large individuals have a natural carrying angle of the shoulders in a flared posture.[2] In order to use a standard keyboard, such workers need to deviate their wrists, arms and shoulders into a non-neutral posture, which can cause significant problems in the upper body.[2] Split keyboards or even keyboards with separated right and left halves are usually necessary to accommodate overweight individuals.[2]

Chair manufacturers have responded to the increasing size of workers by producing Big and Tall lines. Many of these chairs do not take into account the physical changes that occur with increased body fat.[2] The lumbar support of the typical chair adjusts from 7-11 inches above the seat pan, but this is usually not high enough for the obese individual. The fat in the buttocks and thighs raise the person up, so the lumbar support needs to extend up to 14" above the seat pan.[2] A deeper lumbar support may also be needed to support greater curvature of the spine.[2] If this is not accommodated, the person may tend to flatten their back against the chair which results in a forward head posture.[2]

Most Big and Tall chairs are made with a broader and longer seat pan. The width is generally required, but added depth can be a problem, especially for shorter females.[2] Many manufacturers have to reduce chair functionality in order to meet strength requirements of the larger worker. Specifically, independent adjustment of seat back and seat pan tilt are generally not available.

Weight Loss Tips
Most likely you have already heard of these suggestions, and maybe even tried a few. But a reminder to take better care of your body is never bad. Best wishes to your efforts to stay committed to good health!

Get fresh. Your daily food intake should consist of three meals and two snacks. For a woman trying to maintain her weight, that's about 2,000 calories a day.[5] If you are trying to lose weight, trim that number by 300 -500 calories.[5] For some people with a slow metabolism, this is still too much food. Eat fewer processed foods and more fresh fruit and vegetables and whole grains to cut calories. A lot of what we grab on the go are packaged foods, which tend to be high in fat, sugar and calories, and are big contributors to weight gain. Most of these foods lack nutritional value, so you don't feel satisfied unless you eat big servings. Be sure to have a healthy snack like yogurt, a small serving of nuts or a piece of fruit on hand so you are never famished; junk food always seems to call your name even louder when you are starving.

Go small. Reduce the amount of food you eat to lose weight. Fill your bowl or plate with a little less food at every meal. To get an accurate idea of what a reasonable serving is, use measuring cups and a food scale. For instance, the recommended serving of rice is half a cup; a serving of beef, pork or chicken is 3.5 ounces.[5]

Keep track. Keeping a food journal is the best way to increase awareness of what and how much you eat.[5, 12] You can enter the foods you eat and track your calories at ishape.com/diary/MealsViewAction, where you will find nutritional information.[5]

Be active. To make up for the lack of activity in our battery-operated and computerized world, regular activity is essential. Cardiovascular workouts burn body fat and calories; muscle-building exercise, such as strength training, helps crank up a sluggish metabolism. For every pound of muscle you build, your body will burn around 50 extra calories a day.[5] Weight loss does not require hours in the gym; 20 – 30 minutes a day of cardio and strength training three times a week will make a big difference in BMI.[5] If you are trying to recover from RSI, aerobic exercise and fitness is critical.[13]

Sneak it in. The biggest reason we do not exercise is lack of time. The trick is to sneak it in by making minor changes to our routine: walk or bike instead of driving whenever you can, return the grocery cart to the store instead of leaving it in the parking lot, hang up the cordless phone after each call instead of leaving it one ht coffee table for easy access, and take the stairs instead of the elevator. These small changes burn calories that can save you from putting on pounds over the years.[14]

Think twice. 75% of overeating is triggered by emotions.[5,12] Many of us use food to satisfy a feeling rather than a growling stomach. Before taking a bite of anything, question why you are eating it. If it is because you are stressed by a deadline or angry about something, wait 15 minutes. Usually the desire to eat will go away by then. If you are truly hungry, then enjoy your food! Another trick when you're in need of a treat: indulge yourself in other ways, like reading your favorite novel or magazine. You can even store the reading material where you keep food so it will be easy to reach.[5,12]

Get a boost. Hormones produced when you are under stress cause the body to conserve fat, especially in the midsection. Therefore, it is best to do other things when the stress-triggered urge to eat hits. If you need a snack, choose one that contains little or no proteins, such as veggie sushi rolls, rice cakes or baked sweet potato or soy chips. You can boost serotonin, the body's feel-good, stay-calm hormone with these starchy snacks.[5]

Take a rest. A recent study at Case Western Reserve University found that, on average, women who sleep five hours or less a night are 32% more likely to gain weight and 15% more likely to be obese than those who get at least seven hours.[5] Another new study from Laval University in Quebec shows that women who slept six to seven hours a night were 11 pounds plumper than those who snoozed seven to eight hours.[5] Seven hours of sleep is extremely important for people who suffer from RSI. The SRI International sleep lab proved that the inflammatory process is activated during sleep deprivation. This makes all health conditions worse!

Weight loss programs

Weight loss tips may help you if you have a few pounds to lose or if you need ideas on how to avoid snacking or overeating. But what about joining a weight loss program? A review of studies that looked at the success of various weight loss programs showed that commercial programs over the internet or organized self-help programs produced minimal weight loss.[15] Studies reviewed eDiets, Health Management Resources, Take Off Pounds Sensibly, OPTIFAST, and Weight Watchers.[15] Of 3 randomized controlled trials, only Weight Watchers showed a loss of 3.2% from initial weight after 2 years.[15.] One randomized trial and several case studies of medically supervised very-low-calorie diet programs found that patients who completed the

program lost 15% to25% of their initial weight, but there were very high costs associated with these programs, drop-out rates were extremely high, and the probability of regaining 50% or more of the weight back in 1 to 2 years was very high.[15] More controlled studies are needed to determine if these programs have efficacy and are cost effective. In the end, it may be more a matter of self-determination and whatever tips, tricks and programs are helpful on a very individual level.

If you decide that one of these programs is appealing to you, you may benefit. There are several that have been rated excellent by online reviews.

- eDiets.com – Rate the best online program by several websites, eDiets designs a free diet profile for you and has 24/7/365 access.[16, 17, 18] The website has a wealth of information on food, exercise, and lifestyle change, member chat rooms, online counselors and nutritionists.[16], [17] The website supports dozens of diet plans including Atkins, the Zone Diet, Mediterranean Diet, and many others, so you can choose a plan that appeals to you. Research shows that online support groups can be just as effective as face-to-face groups.[16, eDiets.com,] Estimated cost is $5/wk, but can cost a lot more if you choose an expensive individual plan. www.ediets.com
- Weight Watchers – Tried and true and supported by more research than any other program, Weight Watchers is a commercial program that encourages a healthy, sensible diet of ordinary foods.[16, 17, 18] There is no prepackaged foods to buy. The plan works through strict calorie management, exercise, a positive attitude, and group meetings and weigh-ins. The program is flexible, which makes it work for many people, and it's cost is reasonable. There is an online at-home program to follow if you prefer.[18] On the down side, the program does not put an emphasis on exercise, has recently changed to more slick marketing techniques and allowing very small quantities of unhealthy food in exchange for healthy choices, not a good idea for people who need to change their habits and food choices radically.[17] Estimated cost is $17 to $20 to join and $10 to $14 weekly.[17] www.weightwatchers.com
- Overeaters Anonymous (OA) – Overeaters anonymous is totally volunteer organization that provides spiritual and emotional support, and encourages members to seek professional help and personalized diet and weight loss programs.[17] One website reviewed it "As good as it gets for those who need serious support".[17] Visit www.overeatersanonymous.org or call (505) 891-2664.
- Take Off Pounds Sensibly (TOPS) – Joining TOPS requires submitting a diet plan prescribed by a health care professional, but no particular plan is endorsed. This is a non-profit program that focuses on meetings and peer support, similar to OA. The website has lots of information on health, nutrition, exercise and other topics, member chat rooms online, success stories, etc.
- NutriSystem – This online weight loss program is good for people who have trouble controlling their portion size and don't want to, or have time to prepare meals themselves.[16, 17] Meals are prepackaged and delivered directly to you. The focus is on a balance of carbs, fats, and proteins with a focus on low glycemic index foods.[17] The website has a wealth of information and online support, counseling, and resources. Emphasis is placed on exercise and there is an online trainer that shows how to do exercises in a healthy and safe way.[17] Access to the website is free. Purchase of the food costs about $300/month, which may seem expensive, but is actually less money than most people spend on food in a month and spares you preparation time.[17] The catch may be in transitioning to regular eating again where you are not trained what foods you can and can't use in meal preparation.[16, 17] The basic strategy is supported by virtually all

dietitians, nutritionists, and doctors and is based on sound principles of diet and exercise. www.nutrisystem.com

This article and all of our articles are intended for your information and education. We are not experts in the diagnosis and treatment of specific medical or mental problems. When dealing with a severe problem, please consult your healthcare or mental health professional and research the alternatives available for your particular diagnosis prior to embarking on a treatment plan. You are ultimately responsible for your health and treatment!

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Table 1: Body Mass Index Lookup

	Under Weight			Normal Weight						Overweight					Obese - Class I					Obese - Class II					Obese - Class III														
BMI	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	50+
Height (ft-in)	Body Weight (lbs)																																					
4'10"				91	96	100	105	110	115	120	124	129	134	139	144	148	153	158	163	167	172	177	182	187	191	196	201	206	211	215	220	225	230	234	239	
4'11"				94	99	104	109	114	119	124	129	134	139	144	149	153	158	163	168	173	178	183	188	193	198	203	208	213	218	223	228	233	238	243	248	
5'0"				97	102	108	113	118	123	128	133	138	143	148	154	159	164	169	174	179	184	189	195	200	205	210	215	220	225	230	236	241	246	251	256	
5'1"				101	106	111	116	122	127	132	138	143	148	153	159	164	169	175	180	185	191	196	201	206	212	217	222	228	233	238	243	249	254	259	265	
5'2"				104	109	115	120	126	131	137	142	148	153	159	164	169	175	180	186	191	197	202	208	213	219	224	230	235	241	246	252	257	262	268	273	
5'3"				107	113	119	124	130	135	141	147	152	158	164	169	175	181	186	192	198	203	209	215	220	226	231	237	243	248	254	260	265	271	277	282	
5'4"				111	117	122	128	134	140	146	151	157	163	169	175	181	186	192	198	204	210	216	221	227	233	239	245	251	256	262	268	274	280	285	291	
5'5"				114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	
5'6"				118	124	130	136	142	149	155	161	167	173	180	186	192	198	204	211	217	223	229	235	242	248	254	260	266	273	279	285	291	297	304	310	
5'7"				121	128	134	140	147	153	160	166	172	179	185	192	198	204	211	217	223	230	236	243	249	255	262	268	275	281	287	294	300	306	313	319	
5'8"				125	132	138	145	151	158	164	171	178	184	191	197	204	210	217	224	230	237	243	250	256	263	270	276	283	289	296	303	309	316	322	329	
5'9"				129	135	142	149	156	163	169	176	183	190	196	203	210	217	223	230	237	244	251	257	264	271	278	284	291	298	305	311	318	325	332	339	
5'10"				132	139	146	153	160	167	174	181	188	195	202	209	216	223	230	237	244	251	258	265	272	279	286	293	300	307	314	321	328	335	341	348	
5'11"				136	143	151	158	165	172	179	186	194	201	208	215	222	229	237	244	251	258	265	272	280	287	294	301	308	315	323	330	337	344	351	358	
6'0"				140	147	155	162	170	177	184	192	199	206	214	221	229	236	243	251	258	265	273	280	288	295	302	310	317	324	332	339	347	354	361	369	
6'1"				144	152	159	167	174	182	189	197	205	212	220	227	235	243	250	258	265	273	280	288	296	303	311	318	326	333	341	349	356	364	371	379	
6'2"				148	165	164	171	179	187	195	203	210	218	226	234	241	249	257	265	273	280	288	296	304	312	319	327	335	343	350	358	366	374	382	389	
6'3"				152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	280	288	296	304	312	320	328	336	344	352	360	368	376	384	392	400	
6'4"				156	164	173	181	189	197	205	214	222	230	238	246	255	263	271	279	288	296	304	312	320	329	337	345	353	361	370	378	386	394	403	411	

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