

## Small changes to prevent weight gain

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Both the developed and developing world face an obesity epidemic. Are the current recommendations for addressing this epidemic attainable? A “small changes” approach to reducing energy intake and increasing physical activity has been proposed, in order to prevent weight gain for the general population.

### Energy balance

Individual energy requirements differ, but when the energy consumed (from all food and drink) equals the energy expended (by metabolism and physical activity), the body is in “energy balance”. When more energy is consumed than expended, the body is in a state of positive energy balance. When more energy is expended than consumed, the body is in a state of negative energy balance. Over time, a positive energy balance will lead to weight gain. Likewise, over time, a negative energy balance causes weight loss. To maintain body weight, consumed and expended energy do not have to balance exactly every day, but over a period of time.

### Preventing weight gain by closing the energy gap

There is a need for both prevention and treatment of obesity, and approaches should consider both reducing energy intake and increasing energy expenditure to be most successful. Dr. James Hill and colleagues of the University of Colorado Denver suggest that preventing weight gain may be easier than losing weight, and this may be easier when energy expenditure is high.<sup>1</sup>

This is because lowering energy intake and total body weight decreases resting metabolic rate. A lower body weight also means less energy is used in physical activities. Therefore energy needs are lower. This is coupled with the challenge that restricting calories typically leads to an increase in hunger.<sup>1,2</sup> Biological mechanisms in the body that help control energy balance seem to preserve existing body weight, making prevention of weight gain easier to achieve than losing weight and sustaining it.<sup>1</sup>

A high level of physical activity allows for a higher energy intake in achieving energy balance. Physical activity uses energy, and builds muscle which increases metabolic rate and therefore energy needs. Whereas people who do not move as much have lower energy needs and thus must balance this with a lower energy intake to keep energy in balance. Although sedentary people can successfully maintain energy balance, they are at a greater risk of weight gain. Typically, lower levels of physical activity are not matched by lower energy intakes.<sup>3</sup> Increased physical activity is one of the factors associated with successful weight maintenance after weight loss.<sup>4</sup> Hence, increased energy expenditure may help in achieving a sustained negative or neutral energy balance.<sup>1</sup>

Hill and colleagues found that over the past couple of decades the median weight gain in the American population was about 1-2 pounds per year (0.45–0.9 kg/year).<sup>5</sup> Through their calculations they estimated

that a positive energy balance of 100 calories per day (kcal/d) could explain most of this gradual weight gain. They refer to this excess positive energy balance of 100 kcal/d as the “energy gap”.<sup>1</sup> They propose that closing the “energy gap”, by reducing energy intake by 100 kcal/d, would prevent weight gain in people with a positive energy balance.

It is important to note that these calculations assumed that 3,500 excess kcal yield a pound (0.45 kg) of body weight gain, a measurement thought by many scientists to be simplistic and flawed over long time periods.<sup>6</sup> However, some of these concerns may be reduced because the energy gap theory is aimed at weight gain prevention rather than weight loss.

The Calorie Reduction Expert Group, an independent group commissioned by the UK Department of Health concluded that a 100 kcal deficit each day is theoretically sound and, for most of the population, should not pose a risk of under-nutrition.<sup>7</sup>

## Small changes approach

The “energy gap” provides a basis for the “small changes” approach, which says that while large changes must occur to sustain individual weight loss, small changes in energy intake and expenditure are perceived to be achievable and should be sufficient to prevent excess weight gain in populations.<sup>8</sup> One reason behaviour changes are perceived to be achievable is because the “small changes” approach provides a quantitative goal.<sup>8</sup> Studies show that people are more likely to reach a goal when it is specific, realistic, and attainable.<sup>9</sup>

Another positive aspect of the “small changes” approach is that individuals can start to make small changes at any time and any body weight. Once people have started making small changes, they are more likely to continue making additional small changes. Over time these small changes can add up to a big lifestyle change.<sup>8</sup> However, one potential drawback is that people might not be as motivated to prevent weight gain as they are to lose weight.

The scientists behind the “small changes” approach formed the organisation America On the Move to promote healthful eating and physical activity. The program advocates that people cut 100 kcal from their energy intake each day and add 2,000 more steps each day (which would burn  $\approx$ 100 kcal) to prevent excess weight gain.<sup>10</sup>

Current consensus is that, overall, making small changes is effective. However, most of the studies to date focus on small changes that promote weight loss, not prevent weight gain. For example, one study found that small changes were most effective at promoting weight loss and sustaining it over a three-month period but concluded that longer-term studies are needed.<sup>11</sup> Another study in a New Zealand workplace found that the people who set small changes in their diet and physical activity patterns and monitored them every week were more successful at losing weight and maintaining it over 12 months than a group who received “usual care”. Usual care involved one consultation with dietary and lifestyle advice, measuring weight only at the beginning and end of the 12-month intervention period.<sup>12</sup>

## Reducing energy intake

The main ways to reduce energy intake are to decrease portion size and/or choose foods that are high in nutrients but low in total calories. Foods that have a high number of calories per volume are considered high-energy or energy-dense foods. These include some types of biscuits, crackers, and other dry savoury and sweet 'snack' foods. Foods such as fruits and vegetables with fewer calories for the same volume are considered low-energy or nutrient-dense foods. In addition, the high fibre and water content of most fruits and vegetables assists weight control by increasing satiety and decreasing appetite.<sup>13</sup> For beverages, unsweetened or lower-energy sweetened alternatives are now widely available, and of course water (bottled or tap) contains zero kcal.

When reducing calories, it is important not to exclude vital nutrients from the diet. For example, fruits and vegetables contain vitamins, minerals, and fibre.<sup>7</sup> Some foods with a high-energy content should not be excluded because they contain essential nutrients. Nuts and oily fish, such as salmon, are two examples of high-energy foods that contain essential fatty acids and also protein. In this case, portion control is paramount. Twenty-eight grams of peanuts (approximately a handful) contain about 150 kcal, so in some cases, decreasing portion size alone (e.g. eating a handful of nuts rather than a 50 g bag) could cut 100 kcal out of the diet.

## Increasing energy expenditure

Physical activity is a key factor in preventing weight gain. In addition to burning calories, it helps maintain lean muscle mass which has a higher metabolic rate than fat tissue. When physical activity levels are low, energy intake needs to be low as well to maintain energy balance, and many adults have difficulty managing energy balance through diet alone. For this reason, the "small changes" approach recommends increasing physical activity in addition to reducing energy intake.

Ten thousand total steps per day has long been stated as a goal for optimal health benefits, but few studies have evaluated the efficacy of this goal.<sup>14</sup> Evidence has shown that increasing normal daily activity by 2,000-2,500 steps is associated with modest weight loss, blood pressure improvements, and improved insulin sensitivity likely because of reduced body fat.<sup>15,16</sup> Two thousand steps is the equivalent to about 20 minutes of walking, although there are individual differences.

Increasing steps by the "small changes" approach advocates an individual sets his or her own goals, to be achieved by small and manageable changes.<sup>1</sup> Goal setting and using pedometers, small devices that count steps, have proven effective for helping people to walk more.<sup>15,17</sup> Examples include walking to work instead of driving, taking the stairs instead of an elevator or escalator, and taking a walk in the morning, during lunch, or in the evening after dinner.<sup>10</sup> Other types of physical activity, such as running and playing sports, count towards the 2,000 steps as well.

## Conclusion

In conclusion, advocating small changes in energy intake and energy expenditure may provide an effective public health approach for preventing weight gain. Evidence from the energy balance theory suggests that decreasing energy intake by 100 kcal/d and increasing steps by 2,000 each day are specific, attainable small changes that can be made to prevent excess weight gain at the population level. Further research should be conducted to confirm that small changes in diet and physical activity can prevent weight gain, as most research to date focuses on small changes that promote weight loss.

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