

CHILDREN, THE FEEDING RELATIONSHIP AND WEIGHT

Selected Annotated References

Compiled & Annotated by Ellyn Satter 2005

Abraham S, Collins G, Nordsieck M. Relationships of childhood weight status to morbidity in adults. *HSMHA Health Reports*. 1971;86:273-284.

Notes: This 35 year longitudinal study was done of 1,963 Hagerstown, MD white males who were 9-13 years old between 1923 and 1928 and 47/48 years old at followup. It showed that lean boys who became fat men had a twofold elevated risk of cardiovascular disease, whereas fat boys who remained fat as adults had only an average risk. The study demonstrated that prevalence rates for hypertensive vascular and cardiovascular renal disease varied within the average, moderately overweight, and markedly overweight adult groups, and that the adult who had been a below average weight child had the highest rate in each category, respectively. ES note: It appears that it is not fatness, per se, but unstable body weight that is correlated with cardiovascular disease.

Adair LS. The infant's ability to self-regulate caloric intake: A case study. *Journal of the American Dietetic Association*. 1984;84(5):543-546.

Notes: The formula and solid food intake of a male demand-fed infant were followed from age 1 week to 9 months. Growth was well canalized and tracked close to the 50th %tile; food intake was near the 10th %tile. The infant adjusted formula intake downward when solid foods were added. Daily intake fluctuated considerably, ie, during the second month, formula intake ranged from 19 to 34.5 oz per day.

Alaimo K, Olson CM, Frongillo EA. Family food insufficiency, but not low family income, is positively associated with dysthymia and suicide symptoms in adolescents. *J Nutr*. 2002;132:719-25.

Notes: Food-insufficient but not low-income adolescents were significantly more likely to have had dysthymia, thoughts of death, a desire to die and have attempted suicide. There is a strong association between food insufficiency and depressive disorder and suicidal symptoms in U.S. adolescents.

Anliker JA, Laus MJ, Samonds KW, Beal VA. Mothers' reports of their three-year-old children's control over foods and involvement in food-related activities. *Journal of Nutrition Education*. 1992;24(6):285-291.

Notes: Parents provided children with structured meals and snacks but controlled food choices and portion sizes at those times. Between times, most children were allowed to help themselves with no limits to the refrigerator, cupboards, etc. ES note: The implications to nurturing and child development are grave. Children need their parents' presence. However, when parents were around they spoiled eating by putting pressure on it. The only way children could eat without interference was by going off on their own to do it. The learning? That to be your own person, you have to be by yourself.

Barlow SE, Dietz WH. Obesity Evaluation and Treatment: Expert Committee Recommendations. *Pediatrics*. 1998;102:e29.

Notes: **Children age 2-7 years**

BMI above the 85th percentile, with or without complications: Maintain weight

BMI > 95th %tile no complications: Maintain weight

BMI > 95th %tile, complications: Lose weight

Children age > 7 years

BMI > 85th %tile, no complications: Maintain weight

BMI > 85th %tile, complications: Lose weight

BMI > 95th %tile: Lose weight

Complications are considered mild hypertension, dyslipidemia and insulin resistance. Patients with acute complications such as pseudotumor cerebri, sleep apnea, obesity hyperventilation syndrome or orthopedic problems should be referred to a pediatric obesity center.

An appropriate final goal for all children and adolescents who are overweight or at risk for overweight is a BMI-for-age below the 85th percentile, although such a goal should be secondary to healthy eating and activity. Intervention: Gradual, targeted increases in activity and targeted reductions in calorie intake by avoiding high-fat, high-calorie foods, following the Food Guide Pyramid, considering the Stop-Light diet; Children's Activity Pyramid.

"Families who are not ready to change may express a lack of concern about the child's obesity or believe the obesity is inevitable and cannot be changed or are not interested in modification of activity or eating."

"Linear growth may slow during weight loss. However, most overweight children are tall, and impact on adult stature appears to be minimal."

"Eating disorders may arise, although a supportive, nonjudgmental approach to therapy and attention to the child's emotional state minimize this risk. A child or parent's preoccupation with the child's weight may damage the child's self-esteem. If weight, diet or activity become areas of conflict, the relationship between the parent and child may deteriorate. When problems such as these occur, clinicians should refer the family to a therapist and should stop the weight control program until the family can proceed without adverse psychological or emotional effects."

Bhargava SK, Sachdev HS, Fall CHD, et al. Relation of Serial Changes in Childhood Body-Mass Index to Impaired Glucose Tolerance in Young Adulthood. *New England Journal of Medicine*. 2004;350:865-875.

Notes: 1492 men and women in India. Thinness in infancy and crossing into higher categories of body-mass index after age two years was associated with impaired glucose tolerance or diabetes in the young adult. However, despite an increase in body-mass index between the ages of 2 and 12 years, none of the subjects was obese at age 12 years. The odds ratio for disease associated with an increase in the body-mass index of 1 SD from 2 to 12 years of age was 1.36 (95 percent confidence interval, 1.18 to 1.57; $P < 0.001$).

Birch LL, Fisher JO. Mothers' child-feeding practices influence daughters' eating and weight. *American Journal of Clinical Nutrition*. 2000;71 :1054-1061.

Notes: Mothers' dietary restraint and perceptions of their daughters' risk of overweight predicted maternal child-feeding practices, which in turn predicted daughters' eating and relative weight. Daughters were heavier when mothers restrained than disinhibited with their own eating.

Birch LL, Fisher JO, Davison KK. Learning to overeat: maternal use of restrictive feeding practices promotes girls' eating in the absence of hunger. *American Journal of Clinical Nutrition*. 2003;78(2):215-220.

Notes: Maternal use of restrictive feeding practices promotes girls' eating in the absence of hunger. This longitudinal study of 182 families assessed whether restrictive feeding practices foster girls' eating in the absence of hunger (EAH). Factors tested were 1) Maternal high versus low restriction, 2) Girls' non-overweight versus overweight and 3) 5, 7, and 9 years of age. Mean EAH increased from 5 to 9 y of age. Higher levels of restriction at 5 y of age predicted higher EAH at 7 y of age and at 9 y of age. Girls who were already overweight at 5 y of age and who received higher levels of restriction had the highest EAH scores at 9 y of age and the greatest increases in EAH from 5 to 9 y of age.

Birmaher B, Ryan ND, Williamson DE, et al. Childhood and adolescent depression: a review of the past 10 years. Part I. *J Am Acad Child Adolesc Psychiatry*. 1996;35:1427-39.

Notes: There is a secular increase in the prevalence of major depressive disorder, and it appears that major depressive disorder is occurring at an earlier age in successive cohorts.

Braddon FEM, Rodgers B, Wadsworth MEJ, Davies JMC. Onset of obesity in a 36 year birth cohort study. *British Medical Journal*. 1986;293:299-303.

Notes: Most 36 year old adults first surveyed in 1946 were not obese at age 11. Subjects showed a pattern of increasing incidence of obesity throughout life and the odds of remaining obese increased with age of onset. This longitudinal study of over 3000 36 year olds in Britain shows that only 21% of obese adults had been obese at age 11 years, even when associated social factors (social class, education level, income) were taken into account. Among men obese at age 36, 51% were overweight and 10% were obese at age 11. Of these obese 36 year olds, 92% were above normal weight ranges by age 26. Of obese 36 year old women, 54% were above normal weight at age 11, and 83% by age 26. Pregnancy increased the likelihood of obesity, as did remaining unmarried for women. Over 40% of people who were obese at age 36 could not have been identified 10 years earlier. 79% of obese 36 year olds first became obese in early adult life. Individuals who became obese between 11 and 36 were often not the most overweight in childhood.. Demographic factors that correlated with obesity included low social class, low income, low educational level, increased parity and being single for women. ES note: This study demonstrates the futility of trying to prevent obesity in adults by preventing it in children. In fact, since the pattern of unstable body weight emerges, the question becomes, what destabilizes body weight? My speculation is this: Poor ability to regulate food intake, probably

growing out of overcontrol or undersupport in childhood.

Bruch H. *Eating Disorders: Obesity, Anorexia Nervosa and the Person Within*. New York: Basic Books; 1973.

Notes: Hilde Bruch was a Texas child psychiatrist who spent her long professional life working with eating disordered children, adolescents and adults. Because she was an astute and disciplined clinical observer, her books and articles are highly regarded and have stood the test of time. Behavioral psychologists have spent the last 30 years testing her clinical hypotheses and found them to hold up very well. She described children who had been controlled with feeding and other issues as acting "as if their body and behavior were the product of other people's influences and actions." Children eat in accordance with what the parent wants rather than in accordance with their own hunger, appetite and satiety. According to Bruch, an eating disorder is the *misuse of eating in an attempt to solve or camouflage problems of daily living that to them seem otherwise insoluble* (p 1). Relative to obesity, Bruch contrasted people who had done well with those who had not. "The common factor in those who had done well was a warm and accepting attitude on the part of the parents, with support and encouragement, and absence of being persecuted for being fat (p 142)." In those had done poorly, in "embarrassing contrast...the more medical treatment the poorer the outcome. The determining factor appears to be the aggressive dissatisfaction of the parents with their child, which finds an unfortunate collaboration by physicians who, by believing in the magic of symptom relief, fail to deal with the underlying problems (p 147)." Relative to those who consistently maintain their weight at a level lower than is physiologically normal for them, whom Bruch calls "thin-fat," she commented: "Never having permitted themselves to eat adequately, they are unaware of how much of their tension, bad disposition, irritability and inability to pursue an educational or professional goal is the direct result of chronic "undernutrition." (p 198)

Chatoor I. Feeding disorders in infants and toddlers: diagnosis and treatment. *Child and Adolescent Psychiatric Clinics of North America*. 2002;11:163-83.

Notes: The Mother-Infant Toddler Feeding Scale is an observational scale that assesses the behavior of infants/toddlers and mothers during feeding. It has been tested for reliability and validity. Subscales are: Dyadic reciprocity; Maternal non-contingency; Dyadic conflict; Bargaining about food; Struggle for control. Feeding disorders are: 1) Feeding disorder of state regulation, 2) Feeding disorder of reciprocity 3) Infantile anorexia 4) Sensory food aversions 5) Feeding disorder associated with concurrent medical condition 6) Posttraumatic feeding disorder.

Chatoor I, Dickson L, Shaefer S, Egan J; A developmental classification of feeding disorders associated with failure to thrive: Diagnosis and treatment. Drotar D. *New Directions in Failure to Thrive: Implications for Research and Practice*. New York: Plenum; 1986:235-258.

Notes: When medically stable children grew poorly, there was a disruption in any one or all three stages of development: Homeostasis, attachment or separation-individuation. The newborn may be colicky and have difficulty achieving regulation of state. The 2-6 month old and parent show a lack of pleasure in each other and the child may vomit or have diarrhea. The 6-36 month old refuses food and struggles for control, peaking at age 9 months. Poorly-growing children showed no delays in cognitive or speech development.

Committee on Nutrition AAO. Prevention of Pediatric Overweight and Obesity. *Pediatrics*. 2003;112:424-430.

Notes: ...few studies on prevention have been performed. The enormity of the epidemic, however, necessitates action using the best information available.

Pediatricians need to proactively discuss and promote healthy eating behaviors for children at an early age and empower parents to promote children's ability to self-regulate energy intake while providing appropriate structure and boundaries around eating.

Significant changes in growth patterns (eg, upward crossing of weight for age or BMI percentiles) can be recognized and addressed before children are severely overweight.

Dietary practices should be fostered that encourage moderation rather than overconsumption, emphasizing healthful choices rather than restrictive eating patterns.

Regular physical activity should be consciously promoted, prioritized and protected within families, schools and communities.

Crawford PB, Shapiro LR; How obesity develops: a new look at nature and nurture. Berg FM. *Obesity & Health*. Hettinger, ND: Healthy Living Institute; 1991;5:40-41.

Notes: Longitudinal study of 185 of an original sample of 450 San Francisco Bay area children

followed from age 6 months to age 16.5 years. Fat infants are at no greater risk than thin ones of growing up fat. Risk of remaining obese only exceeds 50% at age 6-9 or older. Children who later became fat compared with children who remained slim: Ate no more calories, low nutrient-density or sweet foods; were no more likely to have been bottle feed; were started no earlier on solid foods; were no more likely to have been given high-fat milk; were no more likely to have been raised in single-parent families. However, the risk of later obesity increased: With toddler lack of structure in feeding times; with increased parental concern about obesity; with increased incidence of toddler feeding problems; with decreased activity prior to the onset of obesity; with parental wish that a child would be more active. **ES note:** This study also observes how distortions in eating attitudes and behaviors develop early on and persist. This fine study has not been published in its entirety and is available only as the occasional newsletter or workshop summary. The nine-year cohort is reported in Shapiro, *American Journal of Public Health*. 1984;74(9):968-972.

Crockett SJ, Sims LS. Environmental influences on children's eating. *Journal of Nutrition Education*. 1995;27:235-249.

Notes: Of all children under 6 living in families with a female householder, 65.9% were poor, compared to 12.8% of such children in married-couple families. "the poorest of the poor" (those with incomes below half the poverty line) rose from 30% in 1977 to more than 40% in 1993. The poor purchase food more efficiently, obtaining more nutrients per dollar than their more affluent counterparts. 2.5% of very low-income children, ages 1 to 5, had energy intakes less than half of the Recommended Dietary Allowance (RDA). Hunger and food insecurity have reappeared as a serious national problem. Over the past 30 years, the percentage of aggregate personal disposable income spent on food declined from 20% to less than 12%.

Davison KK, Birch LL. Weight status, parent reaction, and self-concept in five-year-old girls. *Pediatrics*. 2001;107:46-53.

Notes: Parents' concerns about their child's weight status and restriction of access to food are associated with negative self-evaluations among 5-year-old non-Hispanic white girls. Independent of girls' weight status, parental concern about overweight in their child was inversely associated with perceived cognitive and physical ability and lower body esteem. The association between concern about overweight and lower body esteem was particularly marked for fathers. Girls who were overweight and whose parents restricted their access to food reported low perceived physical and cognitive ability. Girls who were overweight and whose parents did not report restriction and girls who were not overweight reported approximately the same level of self-concept-which was higher than the girls who were overweight and restricted. **ES note:** Children who are labeled overweight feel flawed in every way: not smart, not physically capable and not good about themselves.

Eisenberg ME, Olson RE, Neumark-Sztainer D, Story M, Bearinger LH. Correlations Between Family Meals and Psychosocial Well-being Among Adolescents. *Archives of Pediatric and Adolescent Medicine*. 2004;158:792-6.

Notes: 1998-1999 school-based survey of 4746 11- to 18-year-old middle school and high school students from ethnically and socio-economically diverse communities in metropolitan Minneapolis/St Paul, Minn.

Family meals eaten together per week:

Never: 14%
1-2 : 19%
3-4 22%
5-6: 19%
7: 10%
>7: 18%

As family meals and family connectedness went up, grade point average and self esteem went up and negative parameters went down: depression, suicidal ideation and attempts, cigarette, alcohol and marijuana. Authors dropped out family connectedness in an attempt to illustrate that family meals alone affected dependent variables. Associations with all parameters were considerably weakened and remained significant only between boys with substance use and depressive symptoms.

All items were self-report from the adolescents. Frequency of family meals was assessed with the question, "During the last 7 days, how many times did all or most of your family living in your house eat a meal together?" Family connectedness was measured with two questions, worded to consider each parent separately and therefore add up four questions: "How much do you feel your (mother,

father) cares about you?" and "Do you feel you can talk to your (mother, father) about your problems?" Eisenmann JC, Katzmarzyk PT, Arnall DA, Kanuho V, Interpreter C, Malina RM. Growth and overweight of Navajo youth: secular changes from 1955 to 1997. *International Journal of Obesity*. 2000;24:211-218.

Notes: Mean age-specific stature appeared to be relatively stable around the 50th percentile of US reference values. Mean age-specific mass appeared to be relatively stable between the 50th and 90th percentiles of the reference values, while the mean BMI tended to fluctuate about the 85th percentile.

Epstein L.H., Myers MD, Raynor HA, Saelens BE. Treatment of pediatric obesity. *Pediatrics*. 1998;101:554-570.

Notes: Reviews diets alone; diet and exercise; diet and exercise plus behavioral modification; protein-sparing modified fast (PSMF) and surgical treatments. Many treatments produce no weight loss. At most treatments produced 10% weight loss. Most losses were not maintained. Actual weight loss is not reported nor is it readily apparent from reading the article. To arrive at generalizations about weight loss, examine table 2. *When data is given*, compare BW with BW change. In many cases actual results are not reported as BW and BW changes but as %OW, then weight loss as %change of %OW. Thus, Epstein's reported 17% weight loss comes down to a loss of 17% of 68%OW of a child weighing 129 lb. Translated into BW and BW change, the figures are 129 lb and 12.9 lb for a loss of 10% of body weight. No relationship was found between self-esteem or depression and changes in weight. Improvement in self-esteem in obese children in treatment may be better accounted for by nonspecific treatment effects than by improvement in weight status.

ES note: Close examination of the data reveals that for the pediatric population, as for the adult population, significant and sustained weight loss is virtually non-existent. However, there may be some helpful information in this article. The more moderate approaches that produced small amounts of sustained weight loss could be construed as resembling the *Satter Feeding Dynamics Approach*: parents established and maintained a division of responsibility in feeding. These Feeding-dynamics-like approaches included: parent targeting (eight sessions over 15 weeks) with behavioral techniques of stimulus control (Structured meals and snacks? Putting food out of sight?), nutrition education (meal planning?). However, these models also appeared to intrude into the child's prerogative of what and how much he ate with techniques like contingency contracting (food avoidance for a reward?) and general behavior management. Approaches that didn't produce weight loss included child self-control training (essentially managing the child's prerogative of what and how much) and techniques that did not directly target eating and activity management. These indirect techniques included cognitive therapy techniques and family therapy.

Epstein LH, Saelens BE, Myers MD, Vito D. The effects of decreasing sedentary behaviors on activity choice in obese children. *Health Psychology*. 1997;16:107-113.

Notes: Reinforcing decreases in 8-12 year old children's preferred sedentary activities can increase their physical activity and decrease their liking for those sedentary activities. Changes were greater than for children in the group that was reinforced for activity. Moreover, children in the decreased-sedentary group increased their liking for high-intensity activity and reported lower caloric intake than the children in the activity-reinforced group.

Eriksson J, Forsen T, Tuomilehto J, Osmond C, Barker D. Fetal and childhood growth and hypertension in adult life. *Hypertension*. 2000;36:790-4.

Notes: Men and women who developed hypertension had low birth weight (P=0.002). They were also shorter in body length at birth (P=0.02). After birth they experienced accelerated growth, so that by 7 years their heights and weights were approximately average. Children who later developed both hypertension and type 2 diabetes, rather than hypertension alone, had small placental size as well as small body size at birth, and their accelerated postnatal growth continued beyond 7 years. ES: Unclear whether the precipitant is poor fetal growth or divergence in early life.

Eriksson JG, Forsen T, Tuomilehto J, Osmond C, Barker DJ. Early growth and coronary heart disease in later life: longitudinal study. *British Medical Journal*. 2001;322:949-53.

Notes: Improvements in fetal, infant, and child growth could lead to substantial reductions in the incidence of coronary heart disease. Low weight and low BMI at birth and at age 1 year were associated with increased risk of coronary heart disease. After age 1 year, the combination of low early weight and rapid gain in weight and body mass index increased the risk of coronary heart disease in men as measured by hospital admission or death. For each SD increase in BMI between ages 1 and 12 years, hazard ratio was increased by 1.27.

- Faith MS, Scanlon KS, Birch LL, Francis LA, Sherry B. Parent-Child Feeding Strategies and Their Relationships to Child Eating and Weight Status. *Obes Res.* 2004;12:1711-1722.
Notes: Of 22 studies isolated from a comprehensive literature review, parental feeding restriction but no other feeding domain was associated with increased child eating and weight status.
- Fisher JO, Birch LL. Eating in the absence of hunger and overweight in girls from 5 to 7 y of age. *American Journal of Clinical Nutrition.* 2002;76:226-231.
Notes: Young girls (age 5 to 7 years) whose access to palatable foods was restricted by parents were more likely to eat those foods in the absence of hunger than girls who were not restricted. The restricted girls were also more likely to be overweight than the unrestricted girls. Earlier work (JADA 100:1341, 2000) showed the girls who ate in the absence of hunger felt bad about themselves. Another study extended the age range to 9 years (A J Clin Nutr 78:215, 2003)
- Flegal KM, Graubard BI, Williamson DF, Gail MH. Excess Deaths Associated With Underweight, Overweight, and Obesity. *JAMA.* 2005;293:1861-1867.
Notes: Current analyses of NHANES surveys of BMI found a slight decrease in relative risk of mortality of in 25-to-59-year-olds with BMIs of 25 to 30 compared with the "normal" weight category of 18.5 to 25. Relative risks for age categories in BMI ranges <18.5; 18.5 to 25; 25 to 30; 30 to 35; and 35 plus were:
25-to-59-years old: 1.38, 1.00; 0.83; 1.20, 1.83. older: 30 to 35 and less than 18.5, compared with BMI reference 60-to-69 years old: 2.30; 1.00; 0.95; 1.13; 1.63
>70 years old: 1.69; 1.00; 0.91; 1.03; 1.17
Excess deaths in 2000 in the United states relative to reference BMI category (BMI 18.5 to <25), obesity (BMI 30-35) was associated with 111 909 excess deaths and underweight (BMI <18.5) with 33 746 excess deaths. Overweight (BMI 25 to 30) was associated with decreased mortality: 86 094 fewer deaths.
Longitudinal analysis of the data showed that overweight that had persisted for at least 10 years was still associated with no excess risk and underweight was still associated with an increased relative risk.
- Forsen T, Eriksson J, Tuomilehto J, Reunanen A, Osmond C, Barker D. The fetal and childhood growth of persons who develop type 2 diabetes. *Annals of Internal Medicine.* 2000;133:176-82.
Notes: The increased risk for type 2 diabetes associated with small size at birth is further increased by high growth rates after 7 years of age. The odds ratio for type 2 diabetes was 1.38 for each 1-kg decrease in birthweight. The odds ratio for development of type 2 diabetes was 1.39 for each standard deviation increase in weight between 7 and 15 years of age. The odds ratio was 1.83 with persons whose birthweights were below 3,000 g.
- Garn SM, Clark DC. Trends in fatness and the origins of obesity. *Pediatrics.* 1976;57:443-456.
Notes: Based on the Ten-State Nutrition Survey. Levels of fatness of children rise progressively with the level of fatness of parental mating combinations. Both boys and girls with two lean parents tend to be the leanest, those with two obese parents tend to be the fattest, and those with both obese and lean parents in between. Overall patterns show preschool losses (in boys), a clear prepubertal gain, an adolescent loss (boys), and a later adult gain which reaches a peak at age 50 to 60 years and decreases thereafter. ES note: This very significant piece of work on the genetic origins of body fatness--and one would assume, the conclusion that fatness is a normal condition for some people--is contaminated by the caveat that follows: "the extent to which fatness runs in families represents the challenge in the identification of the obese, the prevention of obesity, the management of those who are obese and the reversal of obesity...." The moral of the story, particularly in today's weight obsessed climate, is not to settle for reading the author's conclusions.
- Gesell A, Ilg FL. *Feeding Behavior of Infants.* Philadelphia: J.B. Lippincott; 1937.
Notes: This classic feeding book warned that the "scientific age of feeding"--early approaches to bottle feeding with excessive structure and control--would cause "suffering and distortions on both sides." A series of feeding trials demonstrated bottle-fed infants' intrinsic capability for regulating eating.
- Gibbs WW. Obesity: an overblown epidemic? *Scientific American.* 2005;June:70-77.
Notes: An increasing number of scholars have begun accusing obesity experts, public health officials and the media of exaggerating the health effects of the epidemic of overweight and obesity. What is really going on, asserts J. Eric Oliver, a political scientist at the University of Chicago and author of *The Making of an American Epidemic*, Oxford University Press, is that a "relatively small group of scientists and doctors, many directly funded by the weight-loss industry, have created an arbitrary and unscientific definition of overweight and obesity. They have inflated claims and distorted statistics on

the consequences of our growing weights, and they have largely ignored the complicated health realities associated with being fat." One of those complicated realities, concurs Paul Campos, a professor of law at UC Boulder and author of *The Obesity Epidemic: Science, Morality and Ideology*, is strong evidence that genetic differences account for 50 to 80% of variation in fatness within a population. Because no safe and effective methods exist for inducing weight loss, advice to maintain weight at the BMI 25 or below is literally impossible to follow for a large proportion of the population. (ES note: BMI 25 is roughly at the 50th percentile for men throughout life and for women at age 45-54 or younger. See Najjar.) By exaggerating risks of fat and feasibility of weight loss, policy-making agencies perpetuate stigma, encourage unbalanced diets and perhaps even exacerbate weight gain. "The most perverse irony is that we may be creating a disease simply by labeling it as such," Campos states.

Gregg EW, Cheng YJ, Cadwell BL, et al. Secular Trends in Cardiovascular Disease Risk Factors According to Body Mass Index in US Adults. *JAMA*. 2005;293:1868-1874.

Notes: According to the NHANES 1999-2000 survey, relative to the reference weight category (BMI 18.5 to <25), overweight (BMI 25-30) was associated with modest increases in percentage of the population showing elevated total cholesterol (over 240 mg/dL) and high blood pressure (systolic >140 mm Hg or diastolic >70 mm Hg). Obesity (BMI >30) was associated with increased in high blood pressure and diabetes. The >30 BMI category was not broken down to distinguish between 30-35 and >35.

Hamill PVV, Drizd TA, Johnson CL, Reed RB, Roche AF, Moore WM. Physical growth: National Center for Health Statistics percentiles. *American Journal of Clinical Nutrition*. 1979;32:607-629.

Notes: Growth is within normal limits by current standards when values follow central or intermediate percentiles. For the purposes of nutrition and health screening, measurements between the 10th and 25th, and the 75th and 90th %tiles may or may not be normal depending on the pattern of earlier measurements, genetic and environmental factors. Children whose weight-for-stature (or length) is below the 5th %tile or above the 95th %tile should be checked, followed up and possibly referred. ES note: This guideline is often used to define the upper and lower cutoffs for obesity and failure to thrive, respectively. However, note that the article says "followed." Presumably, the following is to determine whether children grow consistently at those extremes and, therefore, demonstrate the internal integrity of that growth pattern.

Holbrook TL, Barrett-Connor E, Wingard DL. The association of lifetime weight and weight control patterns with diabetes among men and women in an adult community. *Int J Obes*. 1989;13:723-9.

Notes: The risk of diabetes increased among overweight adults who were underweight as children or teenagers. Ss: 886 men and 1114 women who were aged 50 years and older when examined in 1984-1987. Compared to those with mean childhood weight, reported underweight as a child or as a teenager significantly increased the rate of diabetes in adults with current BMI greater than 26. A multivariate logistic regression analysis of adult diet and weight behaviors, adjusting for age and current smoking, found that a weight gain or fluctuation between the ages of 40 and 60 of 10 lbs or more significantly increased the diabetes rate. Weight gain between age 18 and the 1984-1987 visit also significantly increased the rate. Exercise as the only means to control weight was associated with a significantly reduced diabetes rate. ES note: It appears that it is not fatness, per se, but unstable body weight that is correlated with adult onset diabetes.

Hood MY, Moore LL, Sundarajan-Ramamurti A, Singer M, Cupples LA, Ellison RC. Parental eating attitudes and the development of obesity in children. The Framingham Children's Study. *International Journal of Obesity*. 2000;24:1319-1325.

Notes: Parents who displayed high levels of disinhibited eating, especially when coupled with high dietary restraint, appeared to foster the development of excess body fat in their children. Children whose parents had particularly high scores on both restraint and disinhibition had particularly high increases in BMI. Children of parents who "successfully" restrained, ie, had no disinhibition, had no increases in BMI. This 6-year longitudinal study of ninety-two 3-5 year old children and their parents was of subjects enrolled in 1987 in the Framingham Children's Study. Self-reported levels of parental dietary restraint, disinhibition and perceived hunger were estimated using Stunkard and Messick's Three Factor Eating Questionnaire. Parental scores on the perceived hunger scale (one of the three factors on the questionnaire) had no clear effect on body fat change of children.

Jahns L, Siega-Riz AM, Popkin BM. The increasing prevalence of snacking among US children from 1977 to 1996. *Journal of Pediatrics*. 2001;138:493-498.

Notes: Used data from the 1977-78 National Food Consumption Survey (NFCS77) and the Continuing Surveys of Food Intake by Individuals for 1989-91 (CSFII89) and 1994-96 (CSFII96). The sample consisted of 21,236 individuals aged 2 to 18 years. The prevalence of snacking increased in all age groups. The average size of snacks and energy per snack remained relatively constant; however, the number of snacking occasions increased significantly, therefore increasing the average daily energy from snacks. Compared with non-snack eating occasions, the nutrient contribution of snacks decreased in calcium density and increased in energy density and proportion of energy from fat. **ES note:** This study gives evidence of grazing. This is problematic from the point of view of lack of necessary structure in child feeding and, instead, giving children unlimited access to food.

Johnson SL, Birch LL. Parents' and children's adiposity and eating style. *Pediatrics*. 1994;94:653-661.

Notes: A previous self-regulation trial (Birch et. al, *Appetite* 20:83, 1993) showed most children were able to compensate for caloric variations in meal preloads. Some were not. This study examined the parents dieting patterns and child feeding practices. It found that parents who were controlling of their own and their children's food intake had children who were less able to self-regulate.

Jones SJ, Jahns L, Laraia BA, Haughton B. Lower Risk of Overweight in School-aged Food Insecure Girls Who Participate in Food Assistance: Results From the Panel Study of Income Dynamics Child Development Supplement. *Archives of Pediatrics and Adolescent Medicine*. 2003;157(8):780-784.

Notes: 1997 Panel Study of Income Dynamics Child Development Supplement, compared the risk of a child aged 5 to 12 years being at or above the 85th percentile of body mass index for age in food insecure and food secure, low-income households when controlling for participation in the Food Stamp Program and the national school lunch and breakfast programs as well as other covariates. Food insecure girls who participated in all 3 programs had a 68% reduced odds (odds ratio, 0.32; 95% confidence interval, 0.12-0.77) of being at risk of overweight when compared with food insecure girls in nonparticipating households and controlling for other factors.

Kern DL, McPhee L, Fisher JO, Johnson S, Birch LL. The postingestive consequences of fat condition preferences for flavors associated with high dietary fat. *Physiology and Behavior*. 1993;54:71-76.

Notes: Hungry 3- and 4-year-old children showed a marked preference for food they had found by previous experience to be calorically dense. **ES note:** This appears to be a sophisticated tactic that children instinctively use to maintain their energy balance. When their energy needs are high, ie, when they are growing fast or very active, they choose food of higher caloric densities (higher in fat or sugar) to supply them with the energy they need. Conversely, when their energy needs are low, they are less likely to eat high-caloric-density foods.

Keys A, Brozek J, Henschel A, Mickelsen O, Taylor H. *The Biology of Human Starvation*. Minneapolis: University of Minnesota Press; 1950.

Notes: 32 young male volunteers maintained on an average of 1570 calories per day for six months lost about 24% of their body weight. During this time they became impaired physically, emotionally and socially. Their interests narrowed drastically and they became food preoccupied and ritualistic about their eating. Physical changes included: 20% decrease in heart volume and 50% decrease in work output; pulse rate slowed; body temperature decreased; basal metabolic rate decreased by 40%; excess fluid accumulated; skin and hair decreased in quality. Evidence of metabolic conservation emerged: subjects felt cold, weak, tired easily; had diminished strength and work capacity; were giddy and had momentary blackouts. Their life interests narrowed and they became psychologically constricted: sexual function and interest diminished, they became apathetic, irritable, depressed and moody. They also had a decrease in intellectual curiosity. Their judgment became impaired, grooming deteriorated and they became more neurotic and hysterical. Food talk and thoughts increased, including reading recipes, increasing anticipation of eating, acceptance of previously-disliked food, and increasing fussiness and possessiveness with food. Eating rituals appeared, with dawdling over food, cutting-up and organizing food. Other oral activities increased, including gum-chewing, coffee and tea consumption and smoking. Social activities also deteriorated: Group spirit diminished, group activities were avoided, social conflict and negativity increased and educational programs collapsed. Conversely, occasionally they became exhilarated. During refeeding, their spirits and social behavior continued low for 15 weeks. Subjects experienced hunger as more intense than ever and they wanted more food even when they were physically full. For 20 weeks, they remained preoccupied with food. By 33 weeks after the study they had gone back to eating normal amounts. After refeeding, body composition changed, with fat tissue increasing more rapidly than lean tissue. Abdominal fat increased more quickly than arm, calf and thigh size. The most rapid recovery was from dizziness, apathy and lethargy

with slower recovery from tiredness, weakness and loss of sex drive.

Krick J. Using the Z score as a descriptor of discrete changes in growth. *Nutritional Support Services*. 1986;6(8):14-21.

Notes: Biological characteristics, like height and weight, are distributed in populations according to a bell-shaped curve. The highest frequency of values is close to the mean, with 50% of people's heights and weights plotting within one standard deviation above and below the mean. As values progress to the extremes of the curve, those values are seen with lower and lower frequencies. The Z score, which denotes standard deviation units from the median, is compared to the two most frequently used methods of reporting anthropometric data. Use of the Z score in interpreting, recording, and reporting height/age, weight/age, and weight/height data is recommended. ES note: Compared with growth charts, the Z score gives far more precise way of tracking growth and is particularly helpful when following a small or poorly growing infant.

Lauer RM, Clarke WR. Childhood risk factors for high adult blood pressure: the Muscatine Study. *Pediatrics*. 1989;84:633-41.

Notes: The Muscoda study of 2,445 children observed initially at 7 years of age and at follow-up at 18 years of age and between 20 and 30 years of age. Correlations for blood pressure between childhood and adulthood were 0.21 to 0.39 for systolic blood pressure and -0.01 to 0.50 for diastolic blood pressure. Risk factors evaluated as variables included using oral contraceptives, smoking cigarettes, or having a family history of hypertension, ischemic heart disease, or stroke. Results (analyzing the data with stepwise regression) showed that the two most important predictors of adult high blood pressure are childhood blood pressure and increases in weight from childhood to adulthood. ES note: Stepwise regression exaggerated and may have distorted results.

Legler JD, Rose LC. Assessment of abnormal growth curves. *American Family Physician*. 1998;58:158-168.

Notes: An important part of well-child care is the assessment of a child's growth. While growth in the vast majority of children falls within normal percentile ranges on standard growth curves, an occasional child demonstrates worrisome deviations in weight, height or head size. A single growth percentile value at any particular point in a child's life is only of limited usefulness to the physician. More important is the child's rate of growth. Children whose growth parameters are at the extremes of the growth curve but whose growth rates are normal are likely to be healthy. Conversely, accelerated or slowed growth rates are rarely normal and warrant further evaluation. This article addresses the initial steps to be taken when evaluating children with suspected growth abnormalities, the guiding principles that apply to all growth problems, and the most common growth curve deviations and approaches to their management.

Lissau I, Sorensen TI. Parental neglect during childhood and increased risk of obesity in young adulthood. *Lancet*. 1994;343:324-327.

Notes: 881 (756- 86%) Danish 9- to 10 year olds who received inadequate parental support were fatter. Correlations persisted 10 years later when 756 children were followed up 10 years. Dirty and neglected children appeared to increase the risk of fatness; other family factors did not, including family structure (biological or other parents and number of siblings) or parental overprotectiveness. Comment: Parental neglect may cause a psychological state that affects energy balance by altering behavior (overeating and physical inactivity) or hormone balances influencing fat storage (corticosteroids like cortisol, catecholamines, or insulin). In a related study (Int J Obesity 17:125, 1993), mothers' *not-knowing* about children's sweets intake (not the children's sweets intake *per se*) correlated with higher body weight. **ES note:** Applying feeding dynamics principles to these results raises the possibility that these children suffered from food insecurity or erratic and unreliable feeding, thereby promoting periodic overeating and weight gain.

Ludwig DS, Peterson KE, Gortmaker SL. Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. *The Lancet*. 2001;357:505-508.

Notes: 548 ethnically diverse schoolchildren (age 11.7 years, SD 0.8) from public schools in four Massachusetts communities, studied prospectively for 19 months 1995 to 1997. The Youth Food Frequency Questionnaire (YFFQ) measured average drink intake--including sugar-sweetened drinks--as well as dietary fat and total energy intake at study outset and again 19 months later. Sugar-sweetened drinks were defined as soda, Hawaiian Punch, Kool-Aid, lemonade, sweetened ice tea, and other sugared fruit drinks. Beverage intake was adjusted for BMI, skinfold thickness, dietary intake, physical activity, and television viewing. For each additional serving of sugar-sweetened drink

consumed, BMI increased by a mean of 0.24. Frequency of obesity increased 1.6 times. **ES note:** Beverage studies are often interpreted to mean that food regulation doesn't work with liquids. That may or may not be true. Such interpretations ignore the contribution of feeding dynamics. What is the nature of feeding dynamics when children are allowed to drink as many sweetened beverages as they want? Are parents doing their jobs with providing structured meals and snacks, then putting limits on between-times grazing for food or beverages?

Najjar MF, Rowland M; Anthropometric reference data and prevalence of overweight, United States, 1976-80. *Vital and Health Statistics, National Center for Health Statistics*. Washington, D.C.: U.S. Government Printing Office; 1987; Series 11: No. 238; DHHS Pub. No. (PHS) 87-1688.

Notes: This report represents descriptive data for triceps skinfold and BMI (body mass index) including tables for means and percentiles of BMI by age, race, and sex for ages 18-74 years. Provides estimates of overweight and severe overweight (as defined by >85th or 95th %tile). BMI 25 is roughly at the 50th percentile for men throughout life and for women at age 45-54 or younger. BMI 25-30 encompasses women up to the 75th percentile from age 35 onward and men in the 75th to 85th percentile throughout life. BMI 30 to 35 encompasses women at the 85th to 90th percentiles and men at the 90th to 95th percentiles, again throughout life.

National Research Council. *Recommended Dietary Allowances, 10th Edition*. Washington, DC: National Academy Press; 1989.

Notes: The energy intake figures for an individual can vary by as much as 20% over or under the average. ES note: It is not legitimate to dictate how much any person, child or adult, "should" eat. We can only evaluate energy intake based on a range of possible energy requirements.

Neumark-Sztainer D*, Hannan P, Story M, Perry C. Weight-control behaviors among adolescent girls and boys: Implications for dietary intake. *Journal of the American Dietetic Association*. 2004;104:913-920.

Notes: Of 6400 adolescent girls, 65% reported dieting to lose weight, 31% of the total surveyed using extreme methods. Of 2100 adolescent boys, 70% reported dieting to lose weight, 32% of the total surveyed using extreme methods.

Ogden CL, Flegal KM, Carroll MD, Johnson CL. Prevalence and Trends in Overweight Among US Children and Adolescents, 1999-2000. *Journal of the American Medical Association*. 2002;288:1728-32.

Notes: Survey of 4722 children from birth through 19 years of age with weight and height measurements obtained in 1999-2000 as part of the National Health and Nutrition Examination Survey (NHANES). Overweight was defined as at or above the 95th percentile body mass index (BMI) for age growth charts. The prevalence of overweight was 15.5% among 12- through 19-year-olds, 15.3% among 6- through 11-year-olds, and 10.4% among 2- through 5-year-olds, compared with 10.5%, 11.3%, and 7.2%, respectively, in 1988-1994 (NHANES III). The prevalence of overweight among non-Hispanic black and Mexican-American adolescents increased more than 10 percentage points between 1988-1994 and 1999-2000. ES note: Wait to panic on the younger children, and remember the Serdula study says young children have a 60-75% likelihood of slimming down. The numbers of younger children surveyed was very small: around 700 altogether in each age group (B-2 and 2-5). Moreover, Mexican-American and non-Hispanic black children were more heavily represented in the study population than in the population as a whole. Also remember that those children tend to plot heavier naturally--mean weights for Mexican American children are around the 85th %tile. The earlier data on preschool BMI came from an equally small study.

Olson DH. Circumplex model of marital and family systems. *Journal of Family Therapy*. 2000;22:144-167.

Notes: The Circumplex Model focuses on the 3 central dimensions of marital and family systems: cohesion, flexibility and communication. The major hypothesis of the Circumplex Model is that balanced couple and family systems tend to be more functional compared to unbalanced systems. In over 250 studies using the Family Adaptability and Cohesion Scales (FACES), a linear self-report measure, strong support has been found for this hypothesis. In several studies using the Clinical Rating Scale (CRS), a curvilinear observational measure, the hypothesis was also supported. These two assessment tools, the FACES and the CRS, are designed for research, clinical assessment and treatment planning with couples and families.

Peck RE, Marks JS, Dibley MJ, Lee S, Trowbridge FL. Birth weight and subsequent growth among Navajo children. *Public Health Reports*. 1987;102(5):500-507.

Notes: Navajo children studied from birth to 2 years tended to have low length/age (around the 40th %tile or lower) and high weight/age (around the 60th %tile) and high weight/length (between the 60th

and 75th %tile). Even the low birth weight children had weight/lengths that increased to the 60th %tile by age 24 months. Like the Mexican children discussed in the Ryan article, the weight/length of Navaho children must be interpreted in the context of their longitudinal growth pattern, not by comparing with Caucasian norms. Average weight/length for Navajo children appears to be above the 60th or even the 75th %tile.

Purvis GA. Infant nutrition survey. *Gerber Products Company*. 1979.

Notes: From a 24-year recall of 650 children, the 35 heaviest and lightest eaters were selected. The heaviest eaters (1100 calories) were the lightest babies; the lightest eaters (550 calories) were the heaviest babies.

Reilly JJ, Kelly A, Ness P, et al. Premature adiposity rebound in children treated for Acute Lymphoblastic Leukemia (ALL). *Journal of Clinical Endocrinology and Metabolism*. 2001;86:2775-2778.

Notes: Adiposity rebound (AR) occurs substantially earlier in children treated for acute lymphoblastic leukemia (ALL) than in healthy children. Researchers analyzed data on body mass index in 68 children treated for ALL who were in first remission, all of whom had been treated in Scotland between 1991 and 1998 and were 30 months or younger at the time of diagnosis. They also assessed the timing of AR against of cohort 889 healthy British children studied during the 1990s using the same method. Forty-three percent (43%) of ALL children and 4% of controls experience AR by age 37 months, the research team found. At 49 months, 81% and 21% of ALL patients and controls, respectively, had experience AR. Treatment of ALL is associated with a significantly advanced AR. This might, in part, explain the extremely high prevalence of obesity in long-term survivors

Rocandio AM, Ansotegui L, Arroyo M. Comparison of dietary intake among overweight and non-overweight schoolchildren. *International Journal of Obesity and Related Metabolic Disorders*. 2001;25:1651-5.

Notes: Using a cross-sectional design, 32 schoolchildren (11-y-old) were selected at random. The parents of children recorded dietary intake for a week using the food weighing method. The children were considered to be overweight when the weight for height was higher than 90th percentile. Some 46.9% of examined schoolchildren were considered overweight. Percentage energy intake reported was significantly lower in the overweight group compared to the non-overweight children (2138 vs 2292 kCal/day; $P < 0.01$).

Roemmich JN, Wright SM, Epstein LH. Dietary restraint and stress-induced snacking in youth. *Obesity Research*. 2002;10:1120-6.

Notes: After being stressed, low-restraint/low-reactive children ate fewer snacks and high-restraint/high-reactive children ate more snacks compared with the control condition. After covarying for percentage of body fat, the interactions remained ($p < 0.01$). Girls ate less than boys ($p < 0.001$), but sex did not influence eating in control and stress conditions. Children stressed, then classified as low- or high-reactive based on their *perceived* stress.

Rolland-Cachera MF, Bellisle F. No correlation between adiposity and food intake: Why are working class children fatter? *American Journal of Clinical Nutrition*. 1986;44:779-787.

Notes: No correlation was found in French children between energy intake and fatness, but a higher proportion of overweight children was found in lower social classes.

Rolls BJ, Ello-Martin JA, Tohill BC. What can intervention studies tell us about the relationship between fruit and vegetable consumption and weight management? *Nutrition Reviews*. 2004;62:1-17.

Rolls BJ, Engell D, Birch LL. Serving portion size influences 5-year-old but not 3-year-old children's food intakes. *Journal of the American Dietetic Association*. 2000;100:232-234.

Notes: By the end of the preschool period, the amount of food offered influences children's food intake. Sixteen five-year-old day care children ate greater amounts when presented with larger portions of macaroni and cheese at lunch time on the same day a week, once a week for three weeks. In contrast, food intakes of sixteen 3 1/2 year-old children were not affected by portion size; their intake varied little across the portion size manipulation. Conclusions of the authors: Anticipatory guidance to prevent overweight should include clear information on portion sizes for children. **ES note:** This article is interpreted to mean that children can be taught to overeat by large portion sizes. This interpretation overlooks both feeding dynamics and children's developmental characteristics. Large portions alone don't make children overeat but pressure to eat with *any* portion size does. Relative to development, toddlers are working on autonomy. Preschoolers are working on initiative. You can get a preschooler to do your bidding, ie, "clean your plate," because they want to please and can be shamed into doing adults' bidding. You can't do that with a toddler. Toddlers are so committed to being their

own people that they would rather fight than eat.

Rose HE, Mayer J. Activity, calorie intake, fat storage, and the energy balance of infants. *Pediatrics*. 1968;41:18-29.

Notes: Infants show apparently constitutionally determined activity levels, energy intake and body type. In this observational study of 30 babies, the least active 4-6 month-old infants ate the least and were the fattest and the most active infants ate the most and were the leanest.

Ryan AS, Martinez GA, Roche AF. An evaluation of the association between socioeconomic status and the growth of American children: Data from the Hispanic Health and Nutrition Examination Survey--NHANES 1982-1984. *American Journal of Clinical Nutrition*. 1990;51:944S-952S.

Notes: Mexican American children from poor and nonpoor groups tended to be shorter, heavier and fatter than either white or black children. The norm is around 85th percentile W/H. ES note: When evaluating the size and shape of Mexican children, it is important to remember that 85th percentile weight/height is closer to normal growth than 50th percentile. In fact, rather than evaluating growth based on any one plotting, it is far better to evaluate integrity of growth by following for several months or years.

Satter EM; Appendix I. Children and food acceptance: The research. *Child of Mine; Feeding With Love and Good Sense*. Palo Alto, CA: Bull Publishing; 2000.

Notes: Over time, children will learn to be competent with eating. They will eat the foods that appear regularly on the family table, and they will automatically eat a variety. Variety, in turn, is correlated with positive nutritional status. However, typical childhood eating behaviors and poor information about feeding lead parents to feed in ways that hinder, rather than foster, competent eating. Children need exposure to the food, they need the support of trusted adults and they need *not* to be pressured in any way to eat. Even seemingly positive pressure, like a reward, decreases children's food acceptance. In contrast, children have trouble learning to like new food if they have either too few opportunities to learn or too much pressure on their learning. What does the research have to say about what goes wrong with feeding? In brief, children eat poorly when parents pressure and persuade, limit menus to food that children readily accept and fail to provide regular and reliable opportunities to eat.

Satter EM; Appendix J. Children and food regulation: The research. *Child of Mine; Feeding With Love and Good Sense*. Palo Alto, CA: Bull Publishing; 2000.

Notes: Children know how much they need to eat, and virtually from birth they are resilient and resourceful regulators. From birth on, to do well with food regulation, children depend on responsive parenting. They need help from adults if they are to act on and retain their capability with food regulation. Children need to be able to tune in on what goes on inside of them and be aware of how hungry or how full they are. If adults give them insufficient support--don't offer food regularly or fail to offer appropriate emotional support at feeding times--children can have trouble knowing how hungry or how full they are and can eat too little or too much. If adults are too active and controlling in feeding, children experience so much static and interference from the outside that they can't tune in on their own sensations. Sometimes children go along with pressure from the outside and eat more or less than they really want. Sometimes they fight against that pressure, and, again, eat more or less than they really want. Either way, they lose sensitivity to how much they need and make errors in regulation. They eat too much or too little, and get too fat or too thin.

Satter EM; Chapter 2, "Your child knows how to eat and grow". *Child of Mine; Feeding With Love and Good Sense*. Palo Alto, CA: Bull Publishing; 2000.

Notes: If you do a good job of feeding, the chances are very good that your child will grow up to have the size and shape body that is right for him and that he will have a stable and appropriate weight as an adult. However, like no other topic in child nutrition, food regulation and growth is permeated with misunderstanding and pitfalls. Obesity has been targeted as the number one child nutritional problem, and parents who have a child who is chubby--or who just has a family history of fatness--try to take evasive action by restricting their child's food intake. Parents who fear their child is growing "too slowly" will find the issue just as troublesome as those whose child is supposedly growing "too fast." As with restricting a child who presumably eats "too much," trying to "get" a slow-growing child to eat more is an uphill battle that can be extraordinarily unpleasant for everyone concerned and destructive of nurturing relationships. Given our culturally distorted eating attitudes and behaviors, however, we are all too ready to interfere with our children's eating and growth, simply because we are accustomed to interfering with our own. A copy of this chapter may be downloaded from

<http://www.ellynsatter.com/Pages/Book%20Contents%20and%20Reviews.htm>

Satter EM. The feeding relationship. *Journal of the American Dietetic Association*. 1986;86:352-356.

Notes: The feeding relationship is the complex of interactions that takes place between parent and child as they engage in food selection, ingestion and regulation behaviors. The parent is responsible for what is presented to the child to eat, as well as for the physical and emotional setting. The child is responsible for how much is eaten or even whether anything is eaten. Successful feeding demands a caretaker who trusts and depends on information coming from the child about timing, amount, preference, pacing and eating capability. An appropriate feeding relationship supports the child's developmental tasks and helps the child develop positive attitudes about self and the world. It helps him/her learn to discriminate feeding cues and respond appropriately to them. It enhances the child's ability to consume a nutritionally adequate diet and to regulate appropriately the quantity eaten. The feeding relationship is characteristic of the overall parent/child relationship. Distortions that show up in feeding are likely to appear in other aspects of the interaction. Health professionals who intervene with feeding must be aware of the implications for the relationship. A primary objective with any feeding intervention is to increase or protect the parents' sensitivity to the child's feeding cues. If the feeding relationship is disrupted, the health professional should consider a referral for psychosocial evaluation.

Satter EM. Internal regulation and the evolution of normal growth as the basis for prevention of obesity in childhood. *Journal of the American Dietetic Association*. 1996;96:860-864.

Notes: Rather than defining obesity as an arbitrary BMI, percentile or weight on the scale, obesity can be defined as weight instability: divergence from a weight that is normal for the individual. Children who show high weight-for-height can be as consistent, reliable and predictable in their growth as children whose weight-for-height is closer to the mean. However, children whose weight diverges from what is apparently their normal growth pattern need to be evaluated to identify the source of the disruption and that disruption corrected so genetically appropriate growth can resume. Children may diverge from a normal growth curve if they are being fed in restrained fashion, at times of family crisis and if they are being systematically encouraged to overeat. Trusting children's innate processes allows supporting them with positive feeding and lifestyle patterns that let them grow into adults whose bodies reflect their genetic endowment.

Satter, E. M. Position Statement: Eating Management to Prevent and Treat Child Overweight. 2003; accessed December, 2004. Web Page. Available at: <http://www.ellynsatter.com/Pages/ESIPS%20CO.htm>.

Notes: The position of the Ellyn Satter Institute is that the clinical definition of child overweight is not high weight *per se*, but *growth acceleration*: abnormal upward weight divergence for the *individual* child. Based on this clinical definition, each child is compared to only him- or herself, not to statistical cutoff points established for the purpose of population-wide evaluation. This definition avoids labeling as overweight the child whose weight, weight-for-height or BMI are above a certain percentile but is growing consistently. It also allows identifying for early intervention the child whose measurements fall closer to the mean but is nonetheless diverging from his or her previously established growth pattern.

Defining child overweight as growth acceleration reframes prevention. Rather than *avoiding overweight*, the emphasis becomes *supporting each child's normal growth*. Thus, child overweight can be *prevented from birth* with appropriate feeding. Growth acceleration can be *treated* by examining the underpinnings and antecedents of the divergence, restoring positive feeding and letting the child's own capability with energy and growth regulation resolve the problem. Each child has a powerful and resilient ability to eat the right amount of food in order to grow in accordance with his or her genetic endowment. However, each child needs appropriate support from parents and other care providers in order to be able to eat and grow well to manifest that genetic endowment.

Satter EM. *Secrets of Feeding a Healthy Family*. Madison, WI: Kelcy Press ; 1999.

Notes: Not only what to feed and how to feed, but also how to get a meal on the table. "The secret of raising a healthy eater is to love good food, enjoy eating--and teach your child to do the same." Chapters on being a role model, establishing a positive feeding relationship, and managing food (choosing, planning, shopping and cooking) reinforce Satter's principles of "seeking, not avoiding food." Satter is careful to avoid finger-wagging as she emphasizes that "when the joy goes out of eating, nutrition suffers." Satter also applies her principles to nutrition education for children: "Expose

children to the possibilities, encourage them to explore and allow them to develop their capabilities with eating."

Serdula MK, Ivery D, Coates RJ, Freedman DS, Williamson DF, Byers T. Do obese children become obese adults? A review of the literature. *Preventive Medicine*. 1993;22:167-177.

Notes: A meta-analysis of epidemiologic studies found obese children to be at higher risk for obesity as adults, but most obese adults were not obese as children. Obesity was defined by skinfold measurement, densitometry, or various calculations of W/H. Among obese infants and toddlers, less than 25% were found to be obese as young adults. Among obese preschool children, 26-41% were found to be obese as adults and among obese school-age children, 42-63% were obese as adults. The proportion of adults who were obese as children ranged from 5 to 20%. (The one outlier statistic was from France and showed that 44% of obese 18-25 years olds had been obese as preschoolers.) This is a meta-analysis of epidemiological studies conducted in either the United States or Europe between 1970 and 1992. To be included studies had to have anthropometric measurements of participants both as children who were less than 18 years of age and as adults who were 18 years and older. The literature search identified 17 published reports from 15 study populations. The age at initial obesity assessment varied between 6 months and 16 years and the age at final obesity assessment range from 18 years to 53 years. The interval between initial and final assessment ranged from 2 years to 45 years. The risk for adult obesity was greater among children who were at more extreme levels of obesity and for children who were obese at older ages.

ES Note: When evaluating this article it is important to remember the laws of conservation of growth. Children's growth tends to track--to follow a consistent growth channel. An older infant or toddler who stabilizes at the 25th percentile or the 95th percentile is likely to remain in that percentile throughout life. As a consequence it would be valid to expect a correlation between "obesity" (or any W/H category) in children and in adults of 100%. In contrast, this article found correlations of only about 5 to 63% between obesity in childhood and obesity in adulthood. *While authors emphasized the risk of retaining obesity into adult life, in reality, this meta-analysis shows that the tendency is to slimming.*

Sinaiko AR, Donahue RP, Jacobs DR Jr, Prineas RJ. Relation of weight and rate of increase in weight during childhood and adolescence to body size, blood pressure, fasting insulin, and lipids in young adults. The Minneapolis Children's Blood Pressure Study. *Circulation*. 1999;99:1471-6.

Notes: This study followed a cohort of 679 individuals (predominantly white children 66%) aged 7.7 years through 23.6 years to examine the relationship between BMI and insulin levels, lipid and lipoproteins concentrations, and blood pressure. By author definition, 64 children were at risk of overweight (85th to 95th percentile), 50 children were obese (>95th percentile, 7.3% of total sample). Initial childhood weight and BMI were highly correlated with young adult weight and BMI. "The relation between fasting insulin and initial childhood weight was not significant, whereas the relationship to both childhood and adolescent *rates of weight gain* were highly significant. ES note: These results support the premise that weight *acceleration*, not high weight per se, is a legitimate basis for the diagnosis of childhood obesity and likely correlated with health parameters.

Skinner JD, Carruth BR, Houck K, et al. Mealtime communication patterns of infants from 2 to 24 months of age. *Journal of Nutrition Education*. 1998;30:8-16.

Notes: Documented mealtime communication behaviors used by 98 Caucasian infants who were studied longitudinally from 2 to 24 months of age. Lists age-related food-acceptance and food-refusal behavior of infants. Mothers' responses to food rejection, which fell into 3 categories: "don't worry," "offers alternative" and "tries force or bribery." Percentage of related responses to each of the three categories were 16 months: 25, 70 and 5; 20 months: 30, 60 and 10; 24 months: 40, 45 and 10. ES note: The norm in feeding appears to be short order cooking. Mothers plan meals based on what they think their child will eat, then make alternatives if the child refuses the offering.

Stunkard AJ, Harris JR, Pedersen NL, McClearn GE. The body-mass of twins who have been reared apart. *New England Journal of Medicine*. 1990;322:1483-1487.

Notes: This Swedish twin adoption study indicates that identical twins reared apart had a weight correlation of 0.70 for men and 0.66 for women. This article also reviews other twin studies that have similar findings.

Stunkard AJ, Sorenson TIA, Hanis C, et al. An adoption study of human obesity. *New England Journal of Medicine*. 1986;314(4):193-198.

Notes: Adult Danish adoptees resembled their biologic parents but not their adoptive parents across the

range of body fatness: Thin, median weight, overweight and obese.

Townsend MS, Peerson J, Love B, Achterberg C, Murphy SP. Food insecurity is positively related to overweight in women. *Journal of Nutrition*. 2001;131:1738-1745.

Notes: This study used data from the nationally representative 1994-1996 Continuing Survey of Food Intakes by Individuals (CFSII). Food insecurity was related to overweight status for women (n = 4509), but not for men (n = 4970). Excluding the 11 severely insecure women, the prevalence of overweight among women increased as food insecurity increased, from 34% for those who were food secure (n = 3447), to 41% for those who were mildly food insecure (n = 966) and to 52% for those who were moderately food insecure (n = 86). Food insecurity remained a significant predictor of overweight status, after adjustment for potentially confounding demographic and lifestyle variables.

Twenge JM. The age of anxiety? Birth cohort change in anxiety and neuroticism, 1952-1993. *Journal of Personality and Social Psychology*. 2000;79:1007-1021.

Notes: Two meta-analyses (college student and children ages 9-17 years old) find Americans have shifted toward substantially higher levels of anxiety and neuroticism during recent decades. Both college student and child samples increased by 20% in anxiety in the years between 1952 and 1993. The average American child in the 1980s exhibited more anxiety than child psychiatric patients in the 1950s. Correlations with social indices (e.g. crime rates, divorce rates with accompanying child poverty) suggest that decreases in social connectedness and increases in environmental dangers may be responsible for the rise in anxiety.

Whitlock EP, Williams SB, Gold R, Smith PR, Shipman SA. Screening and Interventions for Childhood Overweight: A Summary of Evidence for the US Preventive Services Task Force. *Pediatrics*. 2005;116:e125-144.

Notes: Weight loss results: Among children 8-13 years of age, intensive, generally family-based, short-term (a year or less) behavioral approaches found modest to no changes in BMI results. A few studies found, at most, a 10% decrease in participant BMI values. Some researchers inflated weight loss data above 10% by reporting percentage decrease in *overweight* rather than a percentage decrease in total body weight or BMI.

Results were similar for adolescents, showing modest to no change in BMI. Sibutramine increased weight loss by about 4%.

At age 13 years, overweight children (95th %tile W/H) have a 50% probability of adult obesity (BMI >30).

Wright CM, Parker L, Lamont D, Craft AW. Implications of childhood obesity for adult health: findings from thousand families cohort study. *British Medical Journal*. 2001;323(7324):1280-1284.

Notes: In a longitudinal study of 431 adults followed from 1947 found that before age 13 years, there was little tracking from childhood overweight to adulthood obesity *when using a measure of fatness (bioelectrical impedance) that was independent of build (BMI)*. No excess adult health risk from childhood or teenage overweight was found. Being thin in childhood offered no protection against adult fatness, and the thinnest children *tended to have the highest adult health risk at every level of adult BMI*. Data suggest that whole population interventions in childhood directed at reducing body mass index in childhood may not benefit adult health. Meanwhile, underweight in childhood should still be a focus of concern since it offers no protection against adult obesity and is associated with increased risk of adult disease.

Zack PM, Harlan WR, Leaverton PE, Cornoni-Huntley J. A longitudinal study of body fatness in childhood and adolescence. *Journal of Pediatrics*. 1979;95:126-130.

Notes: HANES (National Health and Nutrition Examination Survey) data showed children had a strong tendency to maintain their relative ranking in skin-fold thickness. 68-77% of children classified as obese in childhood were similarly classified in adolescence. 39 to 52% of lean children remained in that category in adolescence. Tracking for skinfold thickness was strongly correlated with tracking for height. ES note: The logic of this article is complicated by the authors' very common assumption that "obesity" (generally identified as W/H or BMI above the 95 percentile) is an abnormal condition. This article strongly supports children's ability to track and, indeed, indicates a tendency to slimming.

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