

Eating Competence: Definition and Evidence for the Satter Eating Competence Model

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ABSTRACT

The evidence- and practice-based Satter Eating Competence Model (ecSatter) outlines an inclusive definition of the interrelated spectrum of eating attitudes and behaviors. The model is predicated on the utility and effectiveness of biopsychosocial processes: hunger and the drive to survive, appetite and the need for subjective reward and the biological propensity to maintain preferred and stable body weight. According to ecSatter, competent eaters have 1) positive attitudes about eating and about food, 2) food acceptance skills that support eating an ever-increasing variety of the available food, 3) internal regulation skills that allow intuitively consuming enough food to give energy and stamina and to support stable body weight, and 4) skills and resources for managing the food context and orchestrating family meals. Identifying these four constructs allows nutrition professionals to target interventions as well as trust and support the individual's own capabilities and tendency to learn and grow.

Key Words: eating competence, food, nutrition, attitudes, behavior, food acceptance, energy regulation, meal management, food management, adult, adolescent

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The Satter eating competence model (ecSatter) is an inclusive, evidence-based, and practice-based conceptualization of the interrelated spectrum of eating attitudes and behaviors that transcends current conceptualizations of food management. Eating is a complex process made up of learned behavior, social expectations, acquired tastes, and attitudes and feelings about eating in general and about certain food items in particular. ecSatter is predicated on the utility and effectiveness of biopsychosocial processes: hunger and the need to survive, appetite and the desire for subjective reward, and the biological tendency to maintain preferred and stable body weight. According to ecSatter, competent eaters are positive, comfortable, and flexible with eating and are matter-of-fact and reliable about getting enough to eat of enjoyable and nourishing food. ecSatter breaks eating competence down into 4 basic components: (1) attitudes about eating and about food; (2) food acceptance skills; (3) internal regulation skills; and (4) skills and resources for managing the food context and orchestrating family meals. The ecSatter principles of these 4 components are summarized and compared with the conventional approach in the [Table](#). Guidelines to implement ecSatter for nutrition education have been outlined¹; the ecSatter Inventory, a paper and pencil test that calibrates

positive and effective eating attitudes and behaviors has been validated²; and the relationship between ecSatter and indicators of cardiovascular health has been examined.³

ecSatter is based on the principle that internal cues of hunger, appetite, and satiety, if properly attended to, are reliable and can be depended on to inform food selection and guide energy balance and body weight. Those internal processes are supported by regular and reliable access to adequate amounts of rewarding and satisfying food. When attended to and supported, internal cues and management of the eating context are in dynamic equilibrium with predominantly genetically determined body weight, tendencies for movement, and the broader environment.

Within ecSatter, nutritional adequacy is supported by variety. Variety is supported by satisfying basic needs for familiar and preferred food, which in turn supports mastery with an increasing variety of food items, including those that are chosen primarily for their nutritional value.⁴ Accepting, relying on, and responding positively to inner drives with respect to food selection and regulation allows intrinsically rewarding nutritional behaviors and supports positive attitudes about eating. Among those intrinsically rewarding behaviors is managing the food context to provide regular and reliable access to plentiful and aesthetically rewarding food—food that is preferred by the individual.

EATING COMPETENCE

An obvious truth, but one that is all too often forgotten, is that the purpose of eating is to sustain life. On a funda-

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Table. Comparing and Contrasting Food Management: Satter Eating Competence Model (ecSatter) and Conventional Approach

Issue	ecSatter	Conventional Approach
Eating attitudes	Positive, relaxed, flexible. Responsively attuned to outer and inner experiences relative to eating, including relaxed expectation of hedonic rewards from eating.	Unintended negative attitudes secondary to conflict between preferred and prescribed food selection. Ambivalence and anxiety predispose to inconsistent eating behavior.
Food acceptance	<i>Experiential: Attitudes and behavior.</i> Nutritional status maintained through intrinsic motivation to eat a variety of food, including nutritious food: genuine enjoyment and learned food preferences.	<i>Cognitive:</i> Nutritional status maintained through externally motivated conformity to food-selection standards. Downplays oral hedonic needs.
Regulation of food intake	<i>Internal:</i> Cooperates with physiological homeostatic mechanisms and maintains energy balance by attending to sensations of hunger, appetite, and satiety.	<i>External:</i> Encourages ignoring and overruling internal regulatory processes. Calculates calorie requirement, food selection patterns, and portion sizes.
Activity	Encourages intrinsically motivated activity that enhances the salience of internal regulation cues.	Prescribes activity duration to achieve health and weight management goals.
Body weight	Primarily determined by genetics, modified by the dynamic equilibrium of lifestyle, age, activity, and internally regulated food intake.	Defines BMI between 18.5 and 24.9 as target level for all adults of all ethnic groups and all ages.
Body weight intervention	Addresses <i>unstable</i> body weight. Identify and correct limitations and distortions in eating competence and activity to restore weight stability.	Imposes defined food intake and prescribed activity to achieve negative energy balance and defined BMI.
Eating context	Prioritizes <i>structure</i> and <i>meal planning</i> : Emphasizes strategic meal-planning principles in tandem with strong permission to eat adequate amounts of preferred food at predictable times.	Prescribes calorie levels, translates into daily amounts and types of foods distributed among food groups or applied to sample menus.

mental level, eating competence has to do with the behaviors and attitudes that ensure getting *fed*. Maintaining access to a variety of nutritious food in amounts adequate to support the needs and stresses of life is a tremendously complex and unrelenting task. It is self-evident that every society that has survived has done enormous amounts of trial and error to arrive at effective ways of managing food.

ecSatter addresses the complexity of getting fed. To do well with eating, adults must (1) have positive attitudes about eating; (2) be able to learn to like and enjoy a variety of food from the available food supply; (3) have mechanisms for eating the right amount of food to sustain life and support reasonably stable body mass; and (4) be able to manage the food context for themselves and their families by planning, acquiring, storing, preparing, and providing food, as well as by keeping food safe and arranging for opportunities to eat.

The utilitarian function of eating is driven by the pain of hunger and the relief from hunger that go along with eating a satisfying amount of filling and calorically adequate food. Basic survival demands resourcefulness in acquiring food, as well as flexibility in satisfying nutritional needs by eating a variety from the available food supply. Appetite—the aesthetic function of eating—is driven by the pursuit of pleasure and reward from eating familiar food prepared in appealing ways. As illustrated by the variety of ethnic and regional cuisine, few cultures have settled for basic survival and have, instead, endeavored to find food preparation methods that enhance the gustatory rewards from eating.

ecSatter evolved over 40 years of clinical work with adults and children, informed and corrected by research observations about adult eating attitudes and behavior and child feeding dynamics. Most of the definition of competent eating emerged from repeated clinical observations of typical distortions in eating attitudes and behaviors and the resolution of those distortions by instituting their antitheses. Some of the definition of effective adult eating attitudes and behaviors grew out of an understanding of the developmental history of eating attitudes and behaviors and reflects the principles of developmental psychology and the research on children's food acceptance⁵ and food regulation behavior.⁶

Strengths and limitations with respect to adult eating attitudes and behaviors are formed by child feeding patterns. Throughout childhood, in word and deed, parents and other adults teach attitudes about eating, the ability to learn to like the available food, the ability to regulate food intake based on internal cues, and, as children grow up, the ability to manage the food context.⁷⁻⁹ To become competent with eating, children require both structured opportunities to learn and personal autonomy within that structure. Satter's division of responsibility outlines the optimum relationship between parents and children around feeding: the parent is responsible for the what, when, and where of feeding, and the child is responsible for the how much and whether of eating.¹⁰

EATING ATTITUDES FROM THE ecSatter PERSPECTIVE

From the perspective of ecSatter, to support nutritional health, it is critical to establish and maintain positive, confident, relaxed, comfortable, and flexible attitudes about eating. Such positive attitudes allow being responsively attuned to outer and inner experiences relative to eating. Outer experiences include food availability, social interactions with eating companions (and those who control the food supply), and supports or pressures on eating attitudes and behaviors inherent in those interactions. Inner experiences include the sensations of hunger and appetite, anticipatory excitement and arousal, sensory responses to the organoleptic qualities of food, and comfort or conflict with those responses. Inner experience also includes intimate emotional contact with the self. Because eating is so fundamentally linked to earliest experience, with its internalized social and emotional responses, eating in a self-aware fashion can be profoundly moving and even upsetting. Positive attitudes, in turn, are supported by genuine capability with respect to food acceptance, food regulation, and management of the food context.

ecSatter eating attitudes include:

- A positive interest in food and eating.
- Responsive attunement to inner and outer food experiences.
- Relaxed self-trust about managing food and eating.
- Harmony among food desires, food choices, and amounts eaten.

Attitudes have to do not only with being comfortable with food behaviors, but with being trusting of *feelings*, that is, accepting and being comfortable with enjoyment of food and eating and the experience of satiety. Because eating relieves the pain of hunger and provides gustatory pleasure, it is intrinsically powerfully rewarding. For some, their sensual reward and even passionate response is a source of pleasure and celebration; for others, it is a source of shame and anxiety. Individual attitudes about eating can range from extremely positive to extremely negative. Depending on early life experience, as well as current sensory responsiveness, economic circumstances, and the degree to which individuals can achieve their eating and weight goals, eating can be imbued with comfort and reward at one extreme, conflict and anxiety on the other, and neutrality or even disinterest somewhere in between.

Eating attitudes reflect the social and emotional functions, attitudes, emotions, associations, and overtones with which eating is invested and go far beyond the mechanics of food selection. As observed in *Secrets of Feeding a Healthy Family*, "Eating is more than throwing wood on a fire or pumping gas into a car. Feeding is more than picking out food and getting it into a child. Eating and feeding reflect our attitude and relationships with ourselves and with others as well as our histories. Eating is about regard for ourselves, our connection with our bodies and our commit-

ment to life itself. Feeding your child is about the love and connection between you and your child, about trusting or controlling, about providing or neglecting, about accepting or rejecting. Eating can be joyful, full of zest and vitality. Or it can be fearful, bounded by control and avoidance.”¹¹

As will be noted in other sections, attitudes not only shape and inform eating in general but also have a major impact on food-related cognitions and behaviors with respect to regulation of food intake, food acceptance, and management of the food context. Each of the latter 3 areas, in turn, is interactive. The Figure illustrates the dynamics among the 4 areas.

Evidence Supporting ecSatter Eating Attitudes

Most of the evidence identifies negative eating attitudes and has to do with failure to live up to nutrition policy. Although eating attitudes are not addressed in either the Dietary Guidelines¹² or MyPyramid,¹³ it appears that current nutrition policy is having an unintended negative impact on eating attitudes. As early as 15 years ago, the American public expressed considerable ambivalence about adhering to nutrition standards. Over half of respondents in an ADA-commissioned Gallup poll said that eating a healthful diet took too much work. Although consumers reported enjoying eating, 36% said factoring in health takes the fun out of it and that they feel guilty about eating the food they like.¹⁴ In general, consumers say they don’t want to give up the food they like and think a healthful diet takes too much time.¹⁵

Surveys capture the tension created by the expectation of pleasure on the one hand, and guilt about taking pleasure on the other. *PARADE Magazine* commissioned Mark Clements Research to administer the “What America Eats 2005 Survey” by mail in March 2005. The results are based on a national sample of 2088 adults between the ages of 18 and 65 who were selected to conform to the latest US Census data. Findings are projectable to all households nationally, with results accurate to within $\pm 2.2\%$ at the 95% level of confidence. In the 2005 *PARADE* survey,

respondents reported eating a “healthful mix” of food, then indulging in snacks and “pleasure food” as rewards. Fifty-nine percent said they were “familiar with the Food Guide Pyramid,” but “do not really follow it.”¹⁶

The discord identified by the *PARADE* survey between the expectation of pleasure from eating and guilt about taking that pleasure is regularly measured by The American Dietetic Association Survey of Dietary Habits, first done in 1991 and repeated periodically since. Survey respondents numerically rank both the importance they assign to adhering to nutritional standards and their actual behavior in selecting food items that conform to nutritional standards. For the “I know I should, but ...” group, the gap between personal standards and actual behavior is 34%. In the “I’m already doing it” group, who see their nutritional behavior as being exemplary, the gap is 15%. Not surprisingly, the “don’t bother me” group, who profess to assign no value to nutritional standards, report a small gap between internalized standards and actual behavior—only 9%.¹⁷

Body dissatisfaction—the discord between internalized weight standards and external reality—is reflected in attitudes about eating. People who are “too fat,” “too thin,” or simply uncomfortable with their weight often feel ashamed of their eating.¹⁸ Further analysis is likely to show that such weight-dissatisfied people are competent with eating but feel their “unsatisfactory” weight brands their eating as defective.

It appears that negative attitudes can extend to the messenger as well as to the message, because when nutrition professionals set themselves up as arbiters of nutritional excellence, they attract resistance and criticism. A large proportion of consumers sampled said they are “tired of being told what to eat.”¹⁹ A parent in a documentary video addressing WIC reported angrily, “She told me I need to throw the snacks in the garbage. My husband ripped up the papers in the middle of the WIC office. How could she tell me not to buy snacks for my house?... Me and the other girls just tend to go down there and tell them what they want to hear. Because then you’re better off. They don’t pour out information that hurts your feelings.”²⁰

Even anticipated health benefit does not protect against consumer resentment about being told what to eat. In a lead editorial commenting on the Women’s Health Initiative findings that a low-fat diet is not related to disease resistance,^{21–23} the *New York Times* sarcastically observed that “[m]eanwhile, the experts in nutrition and chronic diseases have moved on to a new consensus: it is not the total fat but the kind of fat you eat that is important... Of course such diets have not been subjected to the sort of large-scale study just completed. If they were, by the time the results came in, nutrition experts might have moved on to still another approach.”²⁴

FOOD ACCEPTANCE FROM THE ecSatter PERSPECTIVE

From the perspective of ecSatter, enjoyment and pleasure are primary motivators for food selection, and nutritional

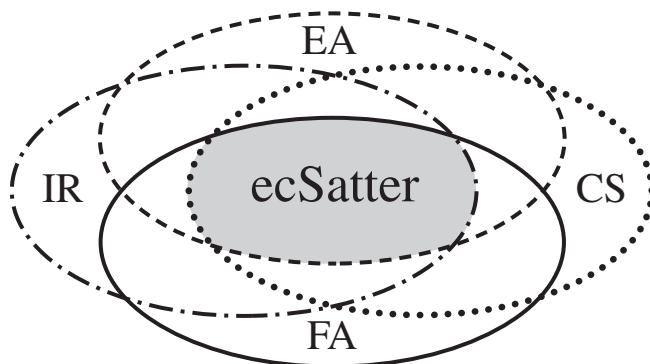


Figure 1. The Satter eating competence model: Eating attitudes, contextual skills, food acceptance, and internal regulation.

excellence is supported by enjoyment and learned food preference based on subjective reward from eating. Food acceptance attitudes and behaviors include taking a positive interest in food, being comfortable in the presence of unfamiliar food, and being inclined to experiment with novel food and learn to like it. Appetite—the interest in eating based on its aesthetic and gustatory rewards—is a powerful motivator for food seeking, and most people prioritize taste as a reason for food selection.²⁵

In the context of ecSatter, food acceptance attitudes and behaviors include:

- Being calm in the presence of food, including unfamiliar and disliked food items.
- Being comfortable with eating preferred food, including food that is high in sugar, salt, and fat.
- Being able to pick and choose from available food, politely and matter-of-factly accepting or turning down food offerings.
- Being able to settle for less-preferred food when necessary to satisfy caloric or other nutritional needs.
- Being curious about novel food.
- Being inclined to experiment with novel food by examining it, watching others eat it, and repeatedly tasting it (perhaps not swallowing early tastes).
- Eventually becoming familiar enough with the taste and texture of novel food to enjoy it and include it as part of a personal food repertoire.

In ecSatter, motivation to eat a variety of food, including nutritious food, is internal and comes from genuine, learned food preference. Competence with respect to food acceptance attitudes and behaviors depends on both early learning and current context. Children learn to like a variety of food provided they are exposed to a variety of food *and* given autonomy with respect to eating or not eating it.⁵ Adults bring tendencies toward particular food acceptance patterns learned in childhood and manifest these food acceptance behaviors, provided the economic and situational framework is in place for getting enough to eat.

Evidence Supporting ecSatter Food Acceptance

Food preference based on positive food acceptance skills produces diets with relatively large food repertoires. Such large repertoires, in turn, have an increased likelihood of being nutritionally adequate. Based on a sample of over 9000 men and women in the Continuing Survey of Food Intakes by Individuals 1994-96, Murphy et al found that variety contributes to nutritional adequacy. Dietary variety, identified using a count of 22 Food Guide Pyramid subgroups, was identified as being both accessible to consumers and highly correlated with mean adequacy across 15 nutrients.²⁶ Working with college-aged women, Drewnowski et al found food preferences and food-frequency scores to be

associated variables that predict nutrient intakes.²⁷ The tendency to consume a variety of food is further supported by the process of sensory-specific satiety: people tire of even favorite food and seek alternatives.²⁸

Research on adult food acceptance has tended to focus on factors in the acceptance or rejection of familiar and unfamiliar food rather than mechanisms of learning to like new food.²⁹ However, Pliner reported increasing young men's acceptance of a novel juice with repeated, neutral exposure.³⁰

The enjoyment of food has the potential to make it more nutritious. In a set of classic experiments, Thai and Swedish women were fed a Thai meal of rice and vegetables flavored with spicy chili paste, fish sauce, and coconut cream. The Thai women absorbed almost 50% more iron in the meal than the Swedes, who "liked the meal" well enough but considered it very spicy.³¹ Pureeing the preferred meal to a pasty consistency decreased iron absorption by 70% compared with the same meal served in the traditional manner. This finding held true for Thai women eating a traditional Thai meal and for Swedish women eating a familiar meal of hamburger, string beans, and mashed potatoes.³² This absorptive discrepancy is likely explained by changes in the cephalic phase of digestion, the preparatory response of the gastrointestinal tract to the sight, smell, or even anticipation of food.

Every cook knows that enhancing the palatability of food by including sugar, salt, and fat in food preparation increases food acceptance. Learning to like steamed vegetables is challenging. Learning to like french fries and cookies is easy. Fat and salt enhance the flavor of food, and preference for sweetness is inborn. Moreover, from the ecSatter perspective, good-tasting food enhances food regulation in that satisfaction of oral hedonic needs is a critical element in the experience of satiety.³³ Food stops tasting good (but is by no means repulsive), and there is a subjective experience of losing interest in eating.

Preference for high-caloric-density food is a natural coping response when food supplies are scarce. Kern et al found that hungry 3-year-old and 4-year-old children are more likely to choose food they have found by previous experience to be calorically dense.³⁴ Consumers cope with food insecurity by preferentially choosing food to satisfy hunger—food of high caloric density—rather than low-calorie food such as fruits and vegetables.^{35,36} The foundation for food security is the basic survival need of getting enough to eat, followed closely by the need for familiar food acquired in socially acceptable ways.³⁷ The common conviction is that poor food selection—low consumption rates of fruits and vegetables, whole grains, low-fat dairy products, and the like—causes the weight gain associated with food insecurity. However, the evidence shows no impact of high fruit and vegetable intake on body weight, even when paired with a low-fat diet.³⁸

Conventional approach is not working. The conventional approach to food selection strives for nutri-

tional excellence through *cognitive* means: setting food-selection standards, applying external motivation to get consumers to conform to those standards, and attempting to convince consumers that nutritious food tastes good.²⁵ Aside from a small discretionary allowance in MyPyramid,¹³ nutrition policy bases food selection on nutrition principles rather than on food preference. It also stresses avoiding or strictly limiting fat, salt, and/or sugar, all of which contribute to the organoleptic qualities of food. The word “enjoy” does not appear in the 2005 Dietary Guidelines document.¹²

That approach is not working. Despite decades of emphasis on “healthful” food selection and lowered body weight in the Dietary Guidelines¹² and their operationalization by the Food Guide Pyramid in the past 10 years,¹³ only a third of today’s consumers score an average of 70 or above on the 100-point Healthy Eating Index (HEI), and only 20% get their 5 A Day of fruits and vegetables.³⁹ HEI is a 10-component scale for measuring the degree of compliance with the Dietary Guidelines and Food Guide Pyramid. Five of the components measure adherence to recommended amounts of low-fat grains, vegetables, fruits, milk, and meat. Two of the 10 components directly measure restriction and avoidance of organoleptic components, fat and salt. Three measure adherence to recommended amounts of fat, saturated fat, and cholesterol. One measures variety and assigns points based on eating 16 different food items over 3 days in recommended serving amounts.

Most consumers have been unsuccessful in long-term dietary modification as a means of improving blood lipid profiles.^{40,41} McCullough et al concluded that adherence to the 1995 Dietary Guidelines as measured by HEI scores has limited benefit in preventing major chronic disease in women.⁴² Thus many researchers, including Cheung et al, believe that medication is becoming the preferred mode of intervention.⁴³

REGULATION OF FOOD INTAKE FROM THE ecSatter PERSPECTIVE

The Satter Eating Competence Model of regulating food intake, energy balance, and body weight is experiential in nature. It emphasizes internally regulated eating, which attends to physiological homeostatic mechanisms that support biologically preferred body weight and maintains energy balance through the sensations of hunger and fullness. Appetitive cues—the pursuit of aesthetics and pleasure—guide regulation through preference for higher- or lower-calorie food depending on energy deficit. In addition to supporting physical activity as a critical component of health and well-being, ecSatter stresses sustainable activity as instrumental in supporting homeostatic energy-regulation processes and therefore stable body weight.⁴⁴ Body weight is primarily determined by genetics, modified, in most cases, to a moderate degree by the dynamic equilibrium of lifestyle, activity, and internally regulated food

intake. Desirable body weight in ecSatter is a tautology—it is the weight that evolves from such a dynamic equilibrium.

ecSatter food regulation attitudes and behaviors include:

- Ability to tolerate hunger sufficiently to conform to the social structure of meals and snacks.
- Confidence that there will be enough rewarding food at structured eating times to satisfy hunger and appetite.
- Ability to eat in an intentional fashion, paying attention and responding to the internal regulators of hunger, appetite, and fullness.
- Ability to stop when satisfied.
- Comfort with the amounts eaten and the experience of satiety.
- Acceptance of the body weight that evolves from such internally regulated eating.

Competence with respect to food regulation attitudes and behaviors includes being consistently relaxed when presented with food items varying in caloric densities and being capable of accessing and responding to internal regulation cues. Provided eating is structured, such regulatory capability continues to function even with access to large portion sizes or high-caloric-density food. Effective internal regulation capability supports each person’s constitutionally appropriate, and therefore relatively stable, body weight and correlates with optimum health to the degree that it can be achieved by that individual. Further, internal regulation of food intake avoids disruption in energy and body weight homeostasis secondary to striving for weight loss.

Evidence Supporting Internally Regulated Food Intake and Body Weight

Internal cues of hunger, appetite, and satiety are in dynamic equilibrium with, and predicated on, individual energy needs. Although average daily energy requirements for groups of people can be estimated, energy requirements for individuals cannot. The National Research Council estimates average energy requirements for individuals of a given age and gender, then states that energy requirements for about 70% of people fall within $\pm 20\%$ of that average.⁴⁵ Calorie intake varies from day to day depending on the dictates of hunger, appetite, and satiety.⁴⁶ Although accurate figures for adults are extraordinarily difficult to obtain, observations with infants⁴⁷ and children⁴⁸ indicate that relatively fat people eat no more on the average than relatively lean ones. In fact, they eat less. Given receptivity to internal cues and lack of cognitive distortion with respect to internal regulation of food intake, people experience satiety at physiologically determined levels of energy intake. A person requiring few calories experiences satiety when eating those few calories; a person requiring a great many calories experiences satiety only when consuming a great many calories. Attempts to ignore and overrule internal regulators produce extremes in energy regulation. Binge

eaters consume lower-than-average intakes when eating is in control and higher-than-average intakes when eating is out of control.⁴⁹ Clinical observations indicate that internal regulation continues to function despite extremes in eating. Binge eaters typically have stable body weight, and correcting binge eating stabilizes weight at pretreatment levels.

Except for moderate increases related to aging, the natural adult tendency is to achieve and maintain an idiosyncratic, constitutionally determined body weight, or body mass index (BMI). Biological characteristics are distributed in nature according to a bell-shaped curve, with the highest frequencies of values close to the mean: 68% of values are within 1 standard deviation (SD) above or below the mean, approximately 95% are within 2 SD, and 99.9% are within 3 SD above or below the mean.⁵⁰ Even though BMI distribution is skewed toward the upper end, it still approximates a bell curve. BMI 25 is roughly at the mean for 20- to 29-year-olds and below the mean for older people. BMI 30 is approximately 1 SD above the mean, and BMI 35 is less than +1.5 SD. BMI increases in women and remains stable in men up to age 64, when it declines slowly for both sexes.⁵¹

Studies of identical twins indicate that genetic factors are a primary determinant of body weight. The studies include Stunkard's findings that weights of Scandinavian adult twins separated at birth resemble those of each other far more than they do those of their adoptive families,^{52,53} and Bouchard's findings that under conditions of positive energy balance, identical twins gain weight and fatten—or resist fattening—similarly to each other.⁵⁴

The body adjusts ingestion of food to maintain bodily homeostasis through processes of short-term regulation, which roughly balance energy intake with expenditure on a day-to-day basis, and long-term regulation of food intake, which correct the errors of day-to-day regulation.⁴⁴ Thus, food intake regulation occurs in weekly, monthly, or even seasonal cycles.

Although short-term laboratory manipulation of energy density shows subjects eat fewer calories when consuming lower-calorie food⁵⁵ or when given smaller portion sizes,⁵⁶ those short-term errors in regulation are corrected when extended over the long term. A year-long calorie restriction weight-loss intervention showed no lower energy intake or greater weight loss in subjects whose diets were supplemented with low-calorie soup versus those who were unsupplemented.⁵⁷

Moderate levels of activity support homeostatic energy-regulation processes and therefore stable body weight. Above a minimum level of activity, subjects balance activity with energy intake and maintain stable body weights. However, subjects whose activity is very low have higher levels of energy intake and gain weight.⁵⁸ Clinical observations show that moderate levels of activity make internal regulation cues more prominent.

BMI, mortality, and morbidity. The BMI range associated with longevity is greater than commonly be-

lieved. Compared with BMI of 18 to 25, BMI of 25 to 30 correlates with a slight *decrease* in relative risk of mortality in 25-to-59-year-olds. BMI 30 to 35 correlates with only a slight increase in mortality. Mortality risk appears to increase significantly at BMI > 35,⁵⁹ but when BMI > 35 is further broken down, mortality risk increases most notably at BMI ≥ 40.⁶⁰ Obesity-related excess mortality declines with age at all BMI levels.^{61,62} Fitness protects against mortality across all BMI categories.⁶³ Lifelong high BMI carries a lower health risk than BMI that becomes high in later life. Variable adult body weight correlates with increased mortality,^{64,65} and high-risk men who lose weight show an elevated mortality rate.⁶⁶

Health risks associated with high BMI can be addressed independently of weight loss by improving eating competence. Eating competence is associated with improved biological health-related parameters.³ Interventions that suspend restraint, institute internally regulated eating, and obviate weight loss as an outcome variable produce improved eating attitudes and behavior, physical self esteem, weight stability, and biomedical parameters.^{67,68} Clinical observations indicate that patients show improvements in blood lipids and indicators of diabetic control when they master eating competence and discontinue erratic eating characterized by binge eating and food restriction.

Striving for weight loss. Initiation of food restriction represents a profound shift with respect to homeostatic food-regulation and weight-regulation processes. Rather than tuning in on and responding to internal regulators of hunger, appetite, and satiety, food restriction and striving for weight loss requires systematically ignoring and overruling those internal regulatory processes. This shift in perspective takes place whether an individual voluntarily initiates food restriction to achieve a body weight that is cognitively rather than biologically determined or has been schooled in food restriction early in life—perhaps even in infancy—by parents who are restrictive with feeding or who are themselves restrained eaters.

The Keys Minnesota starvation studies demonstrate the body's extreme reluctance to and defenses against surrendering body mass. Starved subjects feel cold and weak and tire easily; have diminished strength and work capacity; and are giddy and have momentary blackouts. Their life interests narrow, and they become psychologically constricted: sexual function and interest diminish, they become apathetic, irritable, depressed, and moody. Their judgment becomes impaired, grooming deteriorates, and their emotional stability decreases.⁶⁹ Because overcoming and ignoring those multiple defenses against loss of body mass requires so much stamina and attention to detail, it is little wonder that for most, sooner or later food restriction is suspended and weight loss is regained.⁷⁰ Negative energy balance can, however, be sustained by the highly committed. After years of nationwide advertising, the National Weight Control Registry currently lists 4000 people who have lost at least 30 pounds and kept it off for a year or

more. On the average, registry members report consuming 1400 kcal/day (24% of calories from fat) and expending about 400 kcal/day in physical exercise.⁷¹

Unreliable availability of food mimics food restriction and creates the tendency for eating greater amounts when food is plentiful. A continuing survey of food intakes by 4509 women showed that the prevalence of overweight increases as food insecurity increases, from 34% of the 3447 who are food secure to 41% of the 966 who are mildly food insecure to 52% of the 86 who are moderately food insecure.⁷² Distinctions among levels of food insecurity have to do with the proportion of time that food is in short supply.

Normative restrained eating and energy regulation.

Restrained eating is so common in our culture that it is perceived as normal. The 1999 Behavioral Risk Factor Surveillance Survey found 64% of men and 78% of women to be trying to lose or maintain weight.⁷³ Although one could argue that what is *normative* is *normal*, the fact remains that restrained eating is an ineffective approach to regulating food intake and body weight. Not only are attempts to maintain body weight below biologically preferred levels unsuccessful,⁷⁰ but such attempts likely contribute to tendencies to overeat and gain weight in the population as a whole. Systems of externally dictated food management, particularly when they mandate negative energy balance, are fundamentally fragile and inconsistent because they activate the body's physiological and psychological defense mechanisms. Among those counterregulatory mechanisms is gaining excess weight and accumulating excess fat subsequent to food restriction.⁶⁹ Repeated weight loss and regain is accompanied by sequentially increasing body weight.⁷⁴

Rather than overeating per se in response to stressors, restrained eaters *suspend restraint*: they stop undereating. Then, because restraint has been violated, rather than simply eating enough to satisfy hunger, they go on to overeat. Irrespective of weight, restrained eaters consume more when stressed or depressed compared with nonrestrained eaters, who tend to consume less under stress.⁷⁵ Restrained eaters consume more food after an identifiably high-calorie preload and when exposed to palatable "forbidden" food.^{76,77} They also consume relatively large amounts in response to the stress of doing exacting intellectual tasks.⁷⁸ The degree of distortion resulting from restrained eating appears to depend on the degree of restriction. Compared with rigid control, flexible control is associated with lower disinhibition (less frequent and less severe binge eating episodes), lower overall self-reported energy intake, and lower BMI.⁷⁹ That is, eating distortion still exists with flexible control, it just is not as great.

Even people who say they are nonrestrained eaters show signs of having been conditioned to overeat by prior restraint. Experimental subjects eat more than usual when they are led to anticipate restraint⁸⁰ and after a short-term weight-reduction intervention.⁸¹ Analysis of weekend versus weekday dietary recall data in the Continuing Survey of

Food Intakes by Individuals shows that 19- to 50-year-olds eat more on the weekend than on week days: an average of 115 more kcal/d, 0.7% more calories as fat, and 1.4% more as alcohol, but 1.6% less carbohydrate.⁸² When given yogurt of consistent fat content, healthy women who do *not* label themselves as dieters or restrained eaters eat more yogurt when it is labeled low fat. They also consume more energy during a subsequent lunch meal after eating the low-fat-labeled yogurt than they do after they receive the same yogurt either unlabeled or labeled high fat.⁸³ Apparently the women respond to the low-fat label by disinhibiting their eating—by taking license to ignore internal regulators and eat larger quantities.

EATING CONTEXT FROM THE ecSatter PERSPECTIVE

ecSatter stresses *providing* rather than *depriving*, food *seeking* rather than food *avoidance*. Relative to maintaining nutritional quality of the diet, the primary nutrition goal is *structure* and the primary intervention is *meal planning*. Social importance of mealtimes aside, meals provide reliable access to food, offer a wider variety of food than that commonly chosen for snacks or grazing, and give a framework for repeated, neutral exposure to unfamiliar food. Structure and meal planning build on the concept of intentionality: deliberately feeding oneself by going to some trouble to procure rewarding food, schedule eating times, and set aside time to eat.

Specifically, ecSatter attitudes and behaviors with respect to context include:

- Having the skills and resources to procure and/or provide adequate amounts of rewarding food at predictable intervals.
- Being able to pay attention to food and self during the process of eating.
- Being able to postpone eating and tolerate moderate hunger in order to conform to the structure of meals and snacks.
- Being confident that there will be enough food to satisfy hunger.
- Being able to make meals intrinsically rewarding by choosing preferred food.
- Being able to use sugar, salt, and fat in order to make food taste good and satisfy energy needs.
- Being able to manage time and self in order to suspend other activities and make time for eating.
- Having an intrinsically rewarding system for choosing food to satisfy nutritional needs.

With respect to food management, ecSatter maintains a creative tension between discipline on the one hand, and permission on the other. Discipline is positive and emphasizes maintaining structure—providing rewarding food at predictable sit-down meals and between-meal snacks. Permission is unflinching and supports choosing preferred food

and eating it in amounts that amply satisfy hunger and appetite. Permission, in turn, supports discipline. Having an internally consonant, achievable, and intrinsically rewarding system for choosing what to eat at regular eating times rewards the day-in-day-out effort of maintaining structure.

Maintaining a pattern of regular meals depends on competencies in other areas, including having a relaxed and positive attitude toward eating and being positively attuned to and trusting of internal regulators of hunger, appetite, and satiety. Providing frequent and reliable opportunities to eat in turn supports positive attitudes about eating and a relaxed trust in internal eating cues.

Evidence Supporting Eating Context

National Health and Nutrition Examination Survey (NHANES) respondents reporting 3 meals per day plus 1 or 2 snacks show superior dietary quality compared with a pattern of 2 meals plus 1 or 2 snacks.⁸⁴ For adults, a pattern of regular meals and snacks appears to be more metabolically desirable than today's increasingly common grazing pattern. Subjects who follow a regular meal pattern of 6 eating occasions per day compared with a random pattern of 3 to 9 eating occasions have lower energy intake, greater postprandial thermogenesis, and lower fasting total and LDL cholesterol. Peak insulin concentrations and the area under the curve of insulin responses to the test meal are lower after the regular than after the irregular meal pattern.⁸⁵ Pregnant women who eat 3 meals and 1 or more snacks per day show a lower frequency of preterm births compared with women who missed meals and/or snacks.⁸⁶

There is considerable evidence that preadolescents and adolescents do better when they have regular family meals. This positive benefit has been demonstrated nutritionally,⁸⁷ academically, socially, and emotionally⁸⁸ with respect to avoidance of overweight,⁸⁹ eating disorders,⁹⁰ early drug usage, and early sexual behavior.^{88,91} Significantly fewer adolescents report extreme dieting behaviors when their parents assign priority to family mealtime.⁹⁰

Surveys show that structured and deliberate opportunities to eat are on the wane. Snacking or grazing—frequent small food-intake occasions at irregular or unstructured times, often in association with other activities—now account for a significant proportion of daily calories.^{92,93} Half of the respondents to a nationally representative survey said they eat fewer than 3 meals a day. Seven in 10 respondents skip breakfast, and 4 in 10 skip lunch.¹⁶ Compared with mealtime food, snack items—desserts, sweetened beverages, alcoholic beverages, salty snack food—tend to be nutritionally inferior. Snack food is lower in nutrient density and higher in energy density and the proportion of energy from fat.⁹²

In the clinical experience of the author, meals tend to be for duty and snacks for enjoyment. As discussed in the section on attitude, today's consumers experience a fundamental contradiction between *wants* and *shoulds* with re-

spect to food selection. They feel deprived if they eat the food they *should*, and feel guilty if they eat the food they *want*.^{15,16} The solution in many homes is to follow the food rules for meals and suspend the rules for between-time food rummaging.

ecSatter SUPPORTS NUTRITION POLICY

Despite the fact that ecSatter is fundamentally different from the conventional approach, it is consistent with nutrition policy as defined by the Dietary Guidelines.¹² In contrast to MyPyramid,¹³ which operationalizes the Dietary Guidelines with prescriptions of *what* and *how much* to eat, ecSatter operationalizes the Dietary Guidelines by emphasizing family meals and food-management *strategy* that supports family meals, particularly including choosing intrinsically rewarding food.

Nutritional Adequacy

Studies correlate family meals with increased variety and therefore improved nutrient intake.^{87,88,94} Target food items and nutrients are more likely to show up at regular meals than as part of a meal-skipping, grazing pattern.⁸⁴ Individuals who have mastered structure are likely to widen their food repertoire and might even get around to including the vegetables that they know full well are good for them.

Energy Balance

MyPyramid strives for energy balance with formulas, portion sizes and patterns; ecSatter achieves energy balance with trust. Given mastery of internal regulation capabilities and a positive eating environment, adults are capable of eating the amount of food they need—even when large portion sizes are available—to support stable, constitutionally appropriate body weight. Rather than emphasizing a specific BMI level as a prerequisite to health, ecSatter emphasizes reducing health risks independently of body weight. High eating competence correlates with medical parameters associated with improved health.³

Moderation

MyPyramid encourages moderation by stressing restriction and avoidance. ecSatter supports moderation by encouraging regular access to all food—including preferred high-fat, high-sugar, low-nutrient food—within the structure of meals and snacks. As demonstrated in research with children⁹⁵ and in clinical observations with adults, these strategies avoid extremes and achieve moderation. Food that is no longer forbidden becomes ordinary food that can be consumed in the ordinary course of events. Those food items are therefore subject to the internal regulatory processes of hunger, appetite, and satiety.

IMPLICATIONS

ecSatter frames a perspective on eating attitudes and behaviors that is broader and more inclusive than, as well as philosophically opposite from, the conventional approach. The model separates the components of food- and nutrition-related attitudes, cognitions, and behaviors and defines a measurable vocabulary. Those components of eating competence are: (1) eating attitudes, (2) food acceptance skills, (3) skills with respect to regulation of food intake and body weight, and (4) capability with respect to management of the eating context (including family meals).

The dichotomies between the primary focus and thrust of ecSatter and that of the conventional approach relative to food management are trust versus control and internal versus external. Both work toward the goal of nutritional excellence. ecSatter works toward excellence from the perspective of trusting and supporting the individual's own capabilities and desire to learn and grow. The conventional approach strives for nutritional excellence by laying out expectations and promoting compliance—by educating people about what and how much to eat.

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