Confusion on All Sides of the Calorie Equation

Lessons Learned, Future Directions

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The high prevalence of overweight and obesity in the United States has increased attention to the importance of balancing calories in and out to achieve and maintain a healthy weight. Numerous policy and educational efforts are aimed at helping consumers achieve calorie balance. Still, a calorie disconnect exists as consumers remain largely unaware of personal calorie needs or the relationship between calories and weight management. A key first step in addressing consumers' calorie confusion may be to familiarize them with their ''daily calorie number,'' or the amount of calories that are needed to maintain weight, and how that daily calorie number is impacted by physical activity. The need to individualize calorie balance communications is essential, as each person has a unique weight management profile that will be impacted by many factors, including age, physical activity, and desired weight outcome. Whereas some Americans would like to maintain weight and prevent further weight gain, many others would likely benefit from tipping the calorie balance equation to achieve successful weight loss. To effectively communicate calorie balance, it is imperative to examine consumer response to calorie balance communications. Some messages or terminology, although widely accepted by nutrition and health professionals, may not be understood by consumers. The social-ecological model is a useful framework to further examine factors that impact behavior change related to food and physical activity decisions, providing opportunities for future research and initiatives aimed at helping consumers achieve calorie balance.
Nutr Today. 2013;48(5):195–202

CALORIES IN THE FOREFRONT

The high prevalence of overweight and obesity in the United States[1–3] and its contribution to the risk of noncommunicable diseases[4] have increased attention to the importance of balancing calories in and out to achieve and maintain a healthy weight. Certain population groups, such as Hispanic and African Americans, are at increased risk of obesity.[1] These disparities may be, in part, related to differences in genetics, epigenetics, environmental influences, or a combination of these factors.[5,6]

Consistent with the high prevalence of overweight and obesity, most Americans express concern about their weight.[7] Weight loss and management, as well as appearance, are reported as top drivers for improving the healthfulness of one's diet and for staying active among those who engage in physical activity. While consumers agree that both diet and physical activity are important, many do not connect balancing calories from foods and beverages with calories expended

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The International Food Information Council Foundation is a nonprofit organization dedicated to the mission of effectively communicating science-based information on health, nutrition, and food safety for the public good. The foundation is primarily funded by the broad-based food, beverage, and agricultural industries.

The authors have no conflicts of interest to disclose.

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DOI: 10.1097/NT.0b013e3182a68476

through physical activity as an essential behavior to achieve and maintain a healthy weight.

Calorie balance, also referred to as energy balance by nutrition and health professionals, is defined in the Dietary Guidelines for Americans 2010 as the relationship between calories consumed from foods and beverages and calories expended in normal body functions (ie, metabolic processes) and through physical activity.[8] Although finding the right mix of these factors may be challenging given individual lifestyle and metabolic variability, there is general agreement that targeting the balance between calories consumed and expended is essential for weight management.[8–14]

Nutrition and health professionals have attempted to use the concept of calorie balance to address overweight and obesity, as well as the increased risk of noncommunicable diseases often associated with excess weight.[15] Important to the success of interventions aimed at reducing overweight and obesity is the need to ensure that consumer communications are clearly understood, applicable, and motivating. Analysis of consumer insights is imperative to determine the effectiveness of communication efforts.

This article will address consumer insights related to calorie balance as demonstrated in quantitative and qualitative consumer research conducted by both the International Food Information Council (IFIC) Foundation and the Dietary Guidelines Alliance. The IFIC Foundation is dedicated to the mission of effectively communicating science-based information on health, nutrition, and food safety for the public good. The Dietary Guidelines Alliance is a private-public partnership among leading food, nutrition, and health societies and industry organizations, in liaison with the US government, dedicated to providing consumers with science-based, practical advice on how to apply the Dietary Guidelines for Americans to their lives. Key observations from an IFIC-facilitated Expert Roundtable, which was convened to generate dialogue and future research to improve calorie balance communication, will also be discussed.

EXPLORING CONSUMERS' PERCEPTIONS

Early Insights on Energy Balance

The term *energy balance* is often used in the nutrition and health community, yet it is unclear if this terminology is useful to the consumer. Therefore, the Dietary Guidelines Alliance commissioned a qualitative study in 2004 to explore the effectiveness of using the term *energy balance* in communicating the calorie balance concept. Research results suggest that the term *energy balance* is poorly understood by consumers and is inconsistent with their beliefs.[16]

Confusion about the meaning of energy balance was apparent in focus group participant responses that equated *energy* with a mental or physical state of being or "feeling energetic." Few connected energy to calories. The term *balance* was associated with a balanced diet, meals, or nutrients. Consumers understood food to be a source of "fuel" for the body. Still, energy was not equated with calories, nor was it explicitly conceived as an input or an output.[16]

Consumer understanding of the other side of the equation, or calories expended, was mixed. For example, some consumers who worked out in fitness clubs were familiar with the concept of calories burned with time spent on exercise equipment. However, the association was with a particular exercise rather than physical activity in general and was not understood within the context of the overall calorie balance equation.[16]

These findings highlight the need for a cohesive lexicon to convey the calorie balance concept and the importance of continually monitoring consumer understanding of health messages. Some messages or terminology, although widely accepted among nutrition and health professionals, may not accomplish the desired effect due to inadequate consumer receptivity and/or understanding.

Consumer Perception of the Connection Between Calories and Weight Management

The nationally representative IFIC Foundation Food & Health Survey, a Web-based survey of 1000 American adults 18 years or older, conducted annually since 2006, is designed to gain insights on such topics as calories, weight management, and diet and physical activity behaviors. The 2011 IFIC Foundation Food & Health Survey found that most (69%) report actively trying to lose or maintain their weight. However, fewer than half of Americans (43%) are satisfied with their progress toward losing or maintaining weight. In addition, approximately one-third of those who are trying to lose or maintain weight appear to be indifferent regarding their progress.[7]

Among Americans who report making various dietary modifications, changing the type (72%) and amount of food (63%) remain the top changes to improve healthfulness. Only 22% of those who report making dietary modifications report counting calories. These results suggest that some consumers may find cutting back on how much they eat or changing what they consume easier than counting calories.[7]

The Calorie Disconnect

Data from the 2011 Food & Health Survey reveal evidence of a "calorie disconnect" among consumers.[7] Less than one-half of Americans believe that consuming more calories than burned (more in vs out) leads to weight gain (Figure 1). Only 9% of Americans accurately estimate their daily calorie needs (Figure 2). Furthermore, when asked "How many calories would you say you consumed yesterday," 49% of respondents report that they have no idea; 10% underestimate by reporting 1000 calories or less.

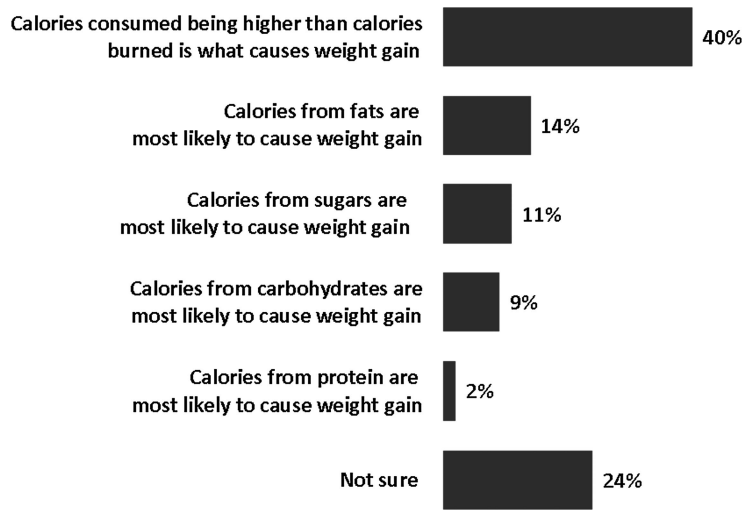
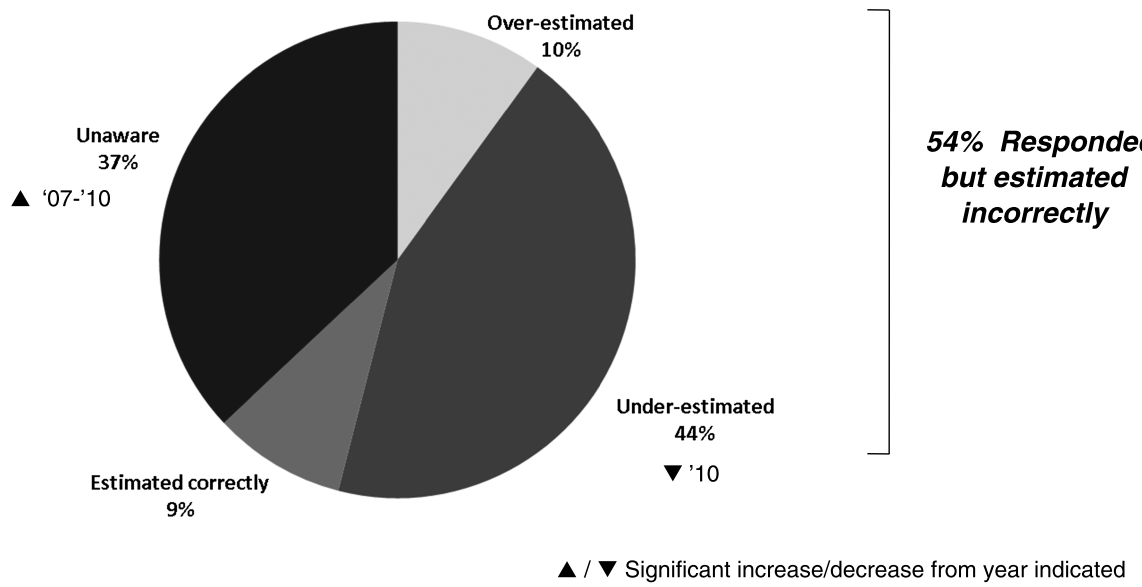


FIGURE 1. Americans' perception of calorie sources and contribution to weight gain. Source: International Food Information Council Foundation 2011 Food & Health Survey: Consumer.[7]

Even more Americans do not know how many calories they burn in a day (60%) or offer inaccurate estimates (24% say 1000 calories or less). Most (69%) report that they do not make an effort to balance calories consumed with calories burned.[7]

Physical Activity: The Other Side of the Calorie Balance Equation

Only 18% of Americans currently meet US Department of Health & Human Services 2008 Physical Activity Guidelines.[7] This is driven by the findings that 43% of Americans



*Question asked since 2006. Estimated correctly is determined with a +/- 100 calorie range base on participant-reported data and the formula noted in the *Dietary Guidelines for Americans, 2010*.

** Modification in 2008 to 2010: "And physical activity" was added to the question. Definitions of physical activity levels were provided.

FIGURE 2. Americans' knowledge of personal calorie needs based on age, weight, height, and physical activity status. Source: International Food Information Council Foundation 2011 Food & Health Survey: Consumer.[7]

report being sedentary, and of those active Americans, most are not incorporating strength training. There is no one factor that appears to be preventing Americans from becoming or staying physically active (Table 1). Overall, nearly equal numbers of Americans report being satisfied (37%) and dissatisfied (36%) with their level of physical activity; the remainder (27%) appear to be indifferent.[7]

Barriers to Tracking Calories Consumed and Burned

In the 2004 Dietary Guidelines Alliance focus groups, consumers stated that they did not want to count calories.[16] They described calorie counting as difficult and tedious, expressing frustration about the perceived caloric inequity between foods eaten and physical activity expended. The 2011 IFIC Foundation Food & Health Survey confirms these earlier focus group findings. Almost one quarter of Americans are not convinced that tracking calories consumed (23%) or burned (19%) "matters all that much." Knowledge is also cited as a barrier to tracking calories consumed (20%) and burned (25%). Importantly, consumers express interest in multiple approaches to make calorie tracking easier (Table 2).[7]

TABLE 1 Americans' Perceived Barriers to Becoming and/or Staying Active

Which of the Following Discourages You From Being Physically Active or Staying on Track With Your Exercise Routine? [Select All That Apply] (n = 1000)	Respondents, %
Lack of energy	36
Lack of will power	31
Lack of time	27
Not seeing results quickly	27
Get bored	24
Not making enough progress	22
Dislike of physical activity	18
Cost of equipment or gym membership	17
Not having someone to workout with	16
Lack of knowledge of what to do	10
Lack of support from friends/family	8

Source: International Food Information Council Foundation 2011 Food & Health Survey: Consumer Attitudes toward Food, Nutrition, and Health.[7]

TABLE 2 Americans' Responses Regarding How to Make Tracking Calories Consumed and Expended Easier

What Would Make It Easier for You to Keep Track of the Number of Calories You Consume or Burn in a Day? [Select All That Apply] (n = 1000)	Respondents, %
Knowing how many calories different types of activities burn	47
Calories on menus	34
Calories on front of food labels	32
Planning your meals and snacks in advance	29
Planning my activity/exercise in advance	22
Web sites	16
Mobile applications	12
Other	1

Source: International Food Information Council Foundation 2011 Food & Health Survey: Consumer.[7]

Putting Prominence on Calorie Labeling

Calories, specifically, have been featured prominently in many initiatives, including menu and front-of-package labeling programs, focused on reversing the obesity trend in the United States and abroad.[17–20] Such initiatives attempt to raise consumer awareness of calories consumed and the use of calorie information in achieving and maintaining a healthy weight.

The 2008 Food and Drug Administration Health and Diet Survey found that consumers who read food labels are most often in search of nutrition information.[21] In the 2011 IFIC Foundation Food & Health Survey, 68% of consumers identify the Nutrition Facts panel as the primary information they use on a food label as they make purchase decisions.[7] Despite consumers' reported dislike for counting calories, caloric content is the top piece of information that label readers report seeking on the Nutrition Facts panel (74%). A closer look at how consumers use nutrition information on food labels, however, reveals a more complex challenge.

Consumers consider serving size and calories when they read the Nutrition Facts panel at point of purchase, yet they are confused by the nuances of servings on food labels and how they relate to portion sizes in dietary recommendations.[22,23] Furthermore, although the Daily Value percentage is a tool that can help consumers make food choices within the context of their daily needs, they find it confusing and do not use it often. Perhaps of greatest concern is that, upon observation, consumers do not use Nutrition Facts from the

food label when making food and beverage purchase decisions as often as they report they do.[22]

Front-of-package and menu labeling is being explored in the United States in an effort to provide consumers with easier access to nutrition facts and to encourage the use of calorie and nutrition information. To date, no significant body of research exists examining the impact of front-of-package labeling on consumer decisions with respect to calories and selection of an overall healthful diet. The US Department of Agriculture (USDA) Economic Research Service conducted research to examine if menu labeling would affect consumer selection of lower-calorie choices and concluded, given mixed findings, that it is too soon to determine how this approach affects consumers' overall diet.[24,25]

Greater availability of calorie information may help increase calorie awareness or "calorie consciousness" among consumers. Still, there is a need for a deeper understanding of the relationship between calories and weight among consumers as well as education on how to use calorie information in the context of the daily diet. Because most Americans are unaware of their personal daily calorie needs, it is difficult to know in what context consumers will use calorie information to influence their daily choices to achieve calorie balance.[7]

Providing food and beverage calorie information is one part of the solution; identifying individual calorie "targets" would provide useful context for applying this information. Helping consumers to discover their daily calorie number based on their personal needs may be a first step to move consumers from awareness to action and appropriately use calorie information provided on labels. In addition, this strategy may help those already interested in making dietary changes to also consider increasing physical activity.

OTHER FACTORS CONTRIBUTING TO THE CALORIE BALANCE EQUATION

Consumers believe that good health is important, but it must be considered within the context of other factors in their lives.[26] The social-ecological model, as outlined in the Dietary Guidelines for Americans 2010, provides a framework to identify and understand the various factors and forces that influence individual food and physical activity decisions (Figure 3).[8] Key elements of this model include individual factors, environmental settings, sectors of influence, and social and cultural norms and values. The following provides examples of current initiatives within the social-ecological framework aimed at helping consumers achieve calorie balance.

The IFIC Foundation and Dietary Guidelines Alliance have consumer insights that provide valuable information about some individual factors, such as knowledge and skills regarding calories and energy balance.[7,16] These insights can be helpful in understanding where gaps occur between awareness and action and in developing intervention

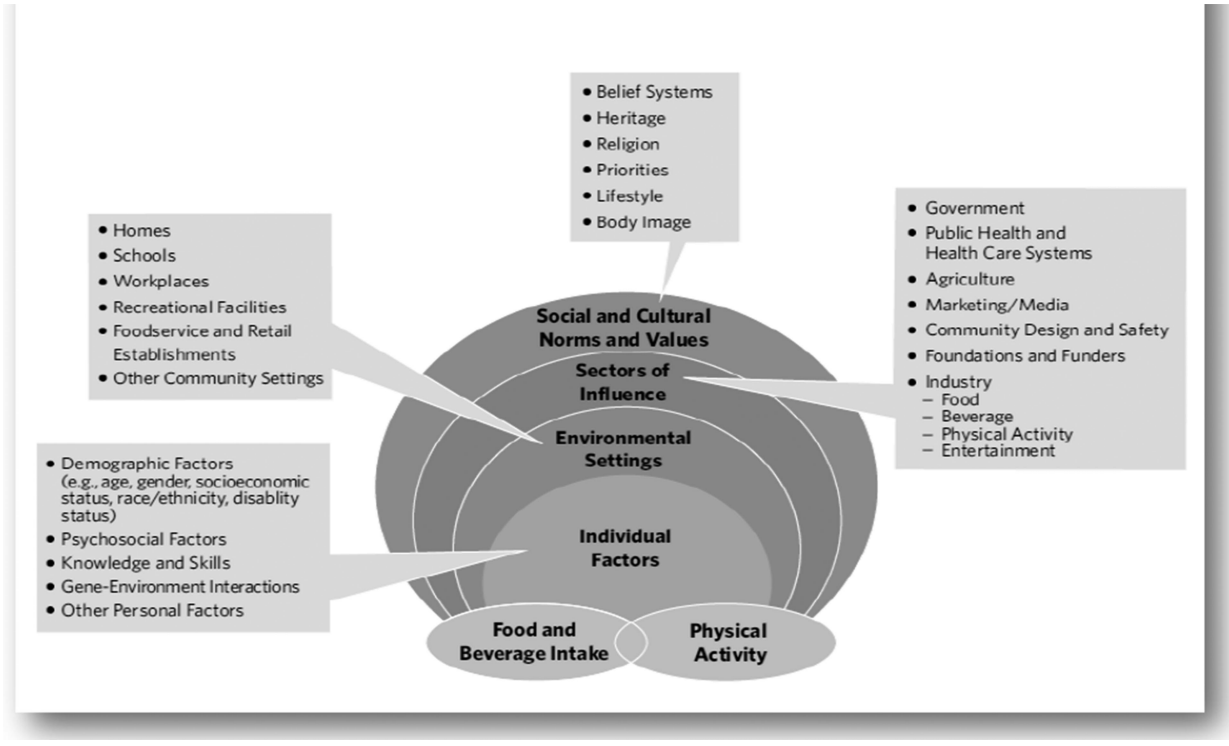


FIGURE 3. The social-ecological framework highlighted in the Dietary Guidelines for Americans, 2010.[8]

strategies that provide consumers with useful tools and the "how-to" application of calorie information.

Some environmental settings such as foodservice and retail establishments, including restaurants and supermarkets, provide calorie information on menu boards and on the front of food and beverage packages.[27,28] This information is provided at point of purchase, where consumers are making food and beverage decisions, thereby potentially having an impact on their choices.

There are a number of sectors of influence that are reinforcing calorie consciousness among consumers. For example, the federal government, among others, offers programs and apps for consumers to not only determine daily calorie needs but also track calories consumed and expended through physical activity. The USDA Center for Nutrition Policy and Promotion's www.ChooseMyPlate.gov/supertracker is one such program.[29]

The Healthy Weight Commitment Foundation (HWCF) is another example of a sector of influence that uses a multifaceted approach to engage a variety of environmental settings to promote healthy weight through balancing calories in and calories out. This approach is achieved by communicating the calorie balance concept to employees in the workplace and children in school programs as well as families.[30]

The HWCF also aims to reduce the caloric content of food and beverage products in the marketplace. Specifically, food and beverage company members of the HWCF have pledged to reduce 1.5 trillion annual calories by the end of 2015 by reducing portion sizes, providing low- and no-calorie options and reducing the caloric content of existing products. In May 2013, the HWCF announced that its members exceeded their calorie reduction goal three years ahead of schedule. The Robert Wood Johnson Foundation is conducting an independent evaluation of the results of this effort and its ability to affect the amount of calories consumed by children and adolescents.[30]

As part of the social-ecological model, social and cultural norms and values can incorporate heritage, religion, belief systems, priorities, lifestyle, and body image.[8] In this fast-paced culture, a lifestyle of immediate results and limited time can potentially influence the choices that individuals make. Hectic lifestyles and a lack of time are identified by consumers, especially parents, as barriers to eating healthfully.[31] Consumers decry a lack of time to devote to exercise, meal planning, and cooking.[26,31] In addition, consumers perceive health goals as long-term, not immediate, and not urgent. The immediate needs of satisfying hunger, with minimal time and cost, and meeting the many demands of family, home, and work often trump long-term health goals.[31]

Individual factors, environmental settings, sectors of influence, and social and cultural norms and values represented in the social-ecological model, as well as the various sector examples previously described, all play an essential role in the formation of the calorie balance landscape. These factors are each complex in their application to an individual's understanding and practice of calorie balance in his/her daily life. The social-ecological model also illustrates the integrative process that occurs, demonstrating that none of the factors work independently, but rather all work in concert to influence the final calorie balance equation. This approach illuminates the opportunity to develop effective intervention strategies that are inclusive of all sectors and that aim not only to educate but more importantly to invoke action.

EXPERT PERSPECTIVES ON BEST PRACTICES TO HELP CONSUMERS ACHIEVE CALORIE BALANCE

Overall, the social-ecological model is a valuable framework that can be used to better understand the complex and diverse influences that affect food and physical activity decisions and to ultimately help consumers achieve calorie balance.[8] This model also reflects the key concepts identified by the Expert Roundtable on Energy and Calorie Balance convened by IFIC on February 19, 2009, in Washington, DC.[32]

The Expert Roundtable examined challenges and experiences specific to communicating the calorie balance equation. As the social-ecological model illustrates, the Roundtable experts concluded that both cultural and societal change, in combination with a "surround-sound" communications approach using a consistent action-oriented message from all sectors, has the potential to positively impact consumer eating and physical activity behaviors.[8,32] As part of this approach, the Expert Roundtable noted that consistent and coordinated communication will need to be developed to reach into the places where consumers live, work, and play. They also recommended "best practices" for communicating the calorie balance equation (Table 3). The Expert Roundtable concluded that further research is warranted to achieve successful communication of the calorie balance equation.[32]

IMPLICATIONS AND FUTURE DIRECTIONS

Nutrition, fitness, and health professionals must develop consumer-centered strategies that go beyond limiting calorie intake to more comprehensive, individualized approaches that inspire action toward balancing calories in with calories out. This will require educating consumers about their daily calorie needs based on many factors, including age, physical activity, and desired weight outcome. In fact, members of the 2010 Dietary Guidelines Advisory Committee called for all Americans to know their calorie needs and learn how to achieve a healthy weight through

TABLE 3 International Food Information Council Expert Roundtable on Energy and Calorie Balance Recommended "Best Practices" for Communicating the Calorie Balance Equation

Individualize messages, as nutritional needs vary among individuals
Personalize message delivery
Customize goal setting based on individual needs
Connect behavior change to an issue of value to the consumer
Design messages that are positive, simple, action oriented and easy to follow
Use message repetition and social influences
Engage consumers at every point where food, beverage, and physical activity decisions are made

Source: Proceedings from the International Food Information Council Expert Roundtable on Energy and Calorie Balance.[32]

calorie balance.[10] An emphasis on calorie balance is also an overarching concept and key communications platform of the Dietary Guidelines for Americans 2010, which states, "Maintain calorie balance over time to achieve and sustain a healthy weight."[8]

Consumer insights reveal clear challenges in helping Americans achieve calorie balance. More recent research completed by the Dietary Guidelines Alliance further illustrates that consumers lack an understanding of calories and their role in weight management as well as their perceived lack of education on calorie balance.[33,34] In developing communications that inspire action toward calorie balance, it may be necessary to first address the more fundamental problem regarding consumers' calorie confusion and knowledge gap. Messages such as "Calories Count" and "Know Your Number" generated a positive response when tested among consumers.[33,34]

A campaign to familiarize consumers with their personal "daily calorie number" is an example of a message that would incorporate the Expert Roundtable's recommendation for individualized calorie balance communications. Indeed, one size does not fit all, as calorie needs for weight management are calculated based on an individual's current weight and physical activity level among other factors. Unlike other key numbers associated with health, such as cholesterol or blood pressure, in which the same number or range of numbers is associated with an "ideal," each person will have a calorie number that is unique to his/her individual weight management profile. Nutrition, fitness, and health professionals, among others, can encourage consumers to access this information as a critical first step in managing weight because it is available for free on many Web sites, including the USDA Center for Nutrition Policy and Promotion's www.ChooseMyPlate.gov/supertracker. This number would also provide consumers with an overall framework and important context for using calorie information to make overall healthful diet and lifestyle choices. In-depth analysis of consumer insights, research interventions, expert perspectives, and a social-ecological approach will help guide further dialogue, shape future research, and develop more effective initiatives to help consumers achieve calorie balance and a healthy weight. It is increasingly apparent that all sectors of society must be engaged in helping consumers make healthful choices to meet dietary and physical activity guidance goals and achieve sustained behavior change to reverse the obesity epidemic.[8,35]

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