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WEIGHT MAINTENANCE: DETERMINANTS
OF SUCCESS

by

Cynthia Mitchell

A project report submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF DIETETIC ADMINISTRATION

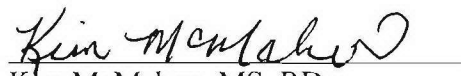
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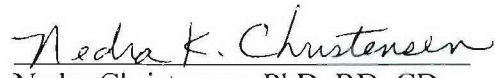
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ABSTRACT

Weight Maintenance: Determinants Of Success

by

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Utah State University, 2005

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This literature review was a selective examination of current obesity and physical activity research and opinions. Its purpose was more to evoke thought and discussion regarding the United States' obesity epidemic, rather than serve as an exhaustive account of prospective causes and solutions. Obesity and physical inactivity are major preventable health problems in the United States, but despite overwhelming evidence regarding the benefits of a healthy weight and regular physical activity, adult, childhood and adolescent obesity rates continue to escalate, creating significant health, medical and economic consequences.

While obesity rates soar, a small population percentage has proven successful in long-term weight maintenance, even in the presence of significantly influential environmental and interpersonal factors. Reviewing strategies employed by National Weight Control Registry members, this literature review discusses the two behavioral components missing from standard or traditional, action-oriented intervention programs.

Although the Stages-of-Change Model explains an individual's readiness to change and the process involved, self-efficacy and self-regulating behaviors were shown to have a more positive effect on long-term maintenance. Thus, recommendations for practical application include incorporating these behavioral components for a more effective and client-centered intervention program.

(42 pages)

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I would also like to send a special thank you to my best friend, Lora, for her support, encouragement, patience and understanding across the miles. Thanks for keeping me grounded and reminded of what's really important in life. I wish to also thank the Air Force and my family who helped to make this all possible.

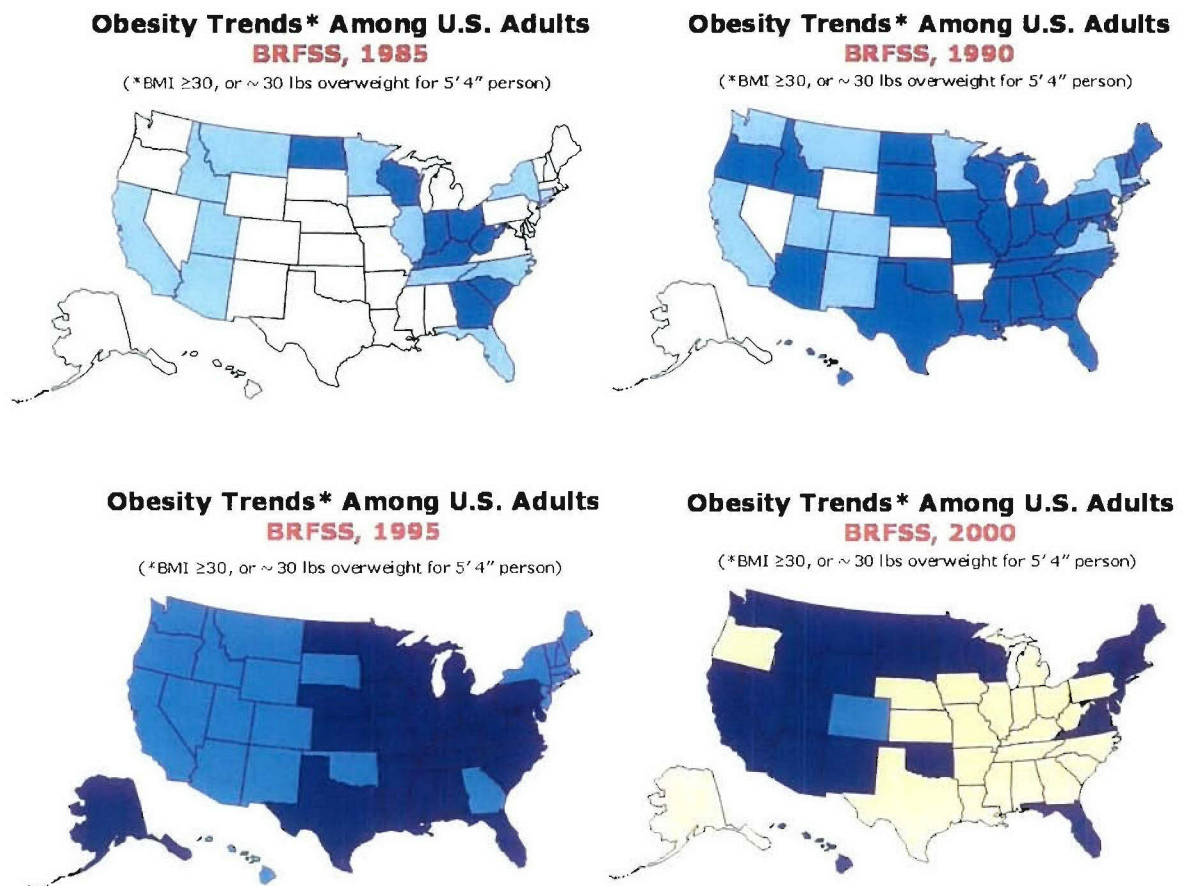
Cynthia Mitchell

LITERATURE REVIEW

Analysis of the U.S. Obesity and Physical Activity Trends

The prevalence of obesity is rising worldwide, and in industrialized countries, particularly the United States, it has reached epidemic proportion. Over the past 20 years, the number of overweight or obese adults has continued to dramatically rise. The following figure illustrates this growing public health concern (1).

Figure 1: Obesity Trends Among U.S. Adults for 1985, 1990, 1995, 2000 and 2003



Unfortunately, adults are not the only population affected. Over the past 25 years, obesity prevalence for children ages 6 to 11 years has quadrupled and more than doubled for adolescents 12 to 19 years of age (3). Diseases once regarded as “for adults only” are becoming more common among our nation’s youth (4). Table 2 and Table 3 detail obesity prevalence rates among children and adolescents respectively (3).

Table 2: Increase in Obesity Prevalence (%) Among U.S. Children (Ages 6 to 11)

	Boys	Girls
1999 to 2000	16	14.5
1988 to 1994	11.6	11
1971 to 1974	4.3	3.6

Table Adapted from the American Obesity Association website

Table 3: Increase in Obesity Prevalence (%) Among U.S. Adolescents (Ages 12 to 19)

	Males	Females
1999 to 2000	15.5	15.5
1988 to 1994	11.3	9.7
1971 to 1974	6.1	6.2

Table Adapted from the American Obesity Association website

The cause of obesity is simply the individual imbalance between energy consumed and energy expended. Thus, the obvious solution is for persons to choose wisely the foods and beverages they consume and appropriately match total energy intake

with adequate energy expenditures through adding and maintaining lean body mass, physical activity and exercise. Unfortunately, this basic mathematical equation eludes millions of Americans. Along with qualitative and quantitative changes in dietary intake, the total population is simply less active despite evidence that suggests regular physical activity helps prevent obesity and many debilitating diseases such as diabetes, hypertension, heart disease and colon cancer (5). It's estimated that 24 percent of adults are inactive and another 54 to 60 percent are insufficiently active to meet the minimum recommendation of 30 minutes of daily, moderate-intensity activity (5, 6). In addition, 61.5 percent of 9 to 13-year-olds don't participate in organized activities during the non-school hours, and 22.6 percent are not involved in any free-time physical activity (7).

Although maintaining a healthy weight and being physically fit can lead to a desirable physical appearance, "obesity is more than a cosmetic concern" (8). Surmountable evidence continues to link obesity to increased risk of diseases, mortality and morbidity and health care costs. Diseases such as coronary heart disease, NIDDM, hypertension, stroke and cancer are more prevalent among overweight and obese individuals (8, 9, 10). Additional health consequences include the following:

- Dyslipidemia
- Congestive heart failure
- Gallstones
- Gout
- Osteoarthritis
- Sleep apnea, asthma and other respiratory problems

- Complications of pregnancy such as gestational diabetes, preeclampsia and operative delivery complications (i.e., c-sections)

In addition to overall poor physical health, “overweight or obese individuals experience social stigmatization and discrimination in employment and academic situations” (2).

Coupled with popular culture’s fixation on thinness, these two consequences may well lead to or exacerbate psychological disorders such as depression, eating disorders, distorted body image and low self-esteem (9).

While many of these health conditions are observed primarily in adults, type-2 diabetes, hypertension, cancer, cardiovascular disease, kidney disease, asthma, orthopedic complications, depression, psychological effects, social stigma and sleep apnea are increasingly being seen in America’s overweight/obese youth population (3, 11). In fact, type-2 diabetes now accounts for half of all new diabetes cases in certain childhood populations, a rate that has increased 10-fold in the past 20 years (12). Dr. Sasson Moulavi of the Siegal Weight Management clinic in Boca Raton, Florida, suggests “This may be the first generation of children that may have a shorter life span than their parents because of obesity, and that is a staggering statistic that is supported by literature” (4, 13).

The Economics of Obesity

The ultimate significance behind the obesity trend is the estimated 300,000 preventable deaths each year caused by obesity (14). In addition to increased prevalence of disease and mortality, obesity greatly impacts the U.S. economy. Estimated health care costs for obese adults totaled \$93 billion in 2002, accounting for 9.1 percent of U.S. medical expenditures in 1998 (14, 15). And while approximately half of these costs were paid by Medicaid and Medicare, individuals are also paying a premium for their excess weight (15). “The lifetime medical costs related to diabetes, heart disease, high cholesterol, hypertension and stroke among the obese are \$10,000 higher than among the non-obese” (6, 10). Given the fact that overweight and obese children and adolescents are more likely to become overweight or obese adults, the full force of obesity’s negative economic impact is yet to come. “If the childhood trend continues unchallenged we are undoubtedly facing a future generation of obese adults far in excess of current numbers. These adults will present an enormous challenge and a severe drain on the financial resources for both present and future healthcare provision[s]” (4).

Ironically, as the obesity trend continues to rise, so does public expenditure on dietary and fitness products and programs. In 2002, \$40 billion was spent on attempts at weight control (10). “America seems to be a country on a diet” (16). According to a survey conducted by the Calorie Control Council, 33 percent, 71 million, of the population is currently dieting, the largest percentage in the past 15 years (17). But despite the billions spent on diet and exercise and the relative ease it takes to shed the initial excess pounds, Americans are missing the most pivotal junction--keeping the

weight off. Ninety-five percent of dieters regain the weight they've lost in one to five years (16, 18, 19). This dichotomy between the undeniable benefits of maintaining a healthy weight and consistent physical activity and the irrefutable and irreparable damage and cost of obesity and inactivity raises three questions:

1. What makes maintaining a healthy weight and a physically active lifestyle difficult? (Section Contributing Factors of Obesity and Inactivity)
2. What differentiates successful individuals from those who continually struggle at repeating the behavior change cycle of action, maintenance, relapse, action, maintenance and relapse? (Section Influential Maintenance Factors and Successful Strategies)
3. How can health professionals, communities and government use this information to implement lasting change within society? (Section Practical Public Application)

Contributing Factors of Obesity and Inactivity

Cited as a complex, multi-faceted disease, obesity involves many contributing factors. It can be viewed as an intricate matrix, or spider web, affected by environmental and interpersonal conditions, creating challenging situations for individuals to make healthy choices amongst a tidal wave-sized American trend of “excessive appetites” (20).

For the purposes of this literature review, selective environmental and interpersonal obesity factors will be discussed. While there remain many other potential causes for obesity -- such as genetic and metabolic changes, socioeconomic status, educational level, ethnicity and more -- the current focus reviews those factors that make it difficult to maintain weight loss and in which individuals or professional organizations can more easily intervene through education, policies and programs (2, 21).

Perhaps the greatest influence on American adult and childhood obesity has been the social and cultural changes that have occurred since the late 1970s and early 1980s. In fact, researcher C. Guthrie suggests that “obesity has been created by structural changes in society that have reduced our nation’s ability to make healthy choices” (4). Such structural changes include: trends in the food supply, food marketing and promotion, trends in popular culture, advances in technology, political policies, urban and community development and the diet and fitness industries themselves.

Trends in Food Supply

Over the past three decades, America has experienced an explosive change in food availability, product development, away-from-home options, portion sizes and

pricing. Although the trend in food supply isn't an isolated causation for obesity, it is accepted that changes in the population's eating behaviors propelling the obesity epidemic are due to a culture that promotes over-consumption (22).

Since 1970, America has witnessed an increase in the availability of food and product development. Advances in technology, transportation and products provide consumers with a myriad of food and beverage choices, conveniently pre-packaged or prepared foods available for delivery, out of a vending machine, from a convenience market or at a drive-through window.

Along with the rise in food availability, the frequency of eating meals away from home has also increased. Between 1972 and 1995, the number of fast-food restaurants grew 147 percent, and other commercial eating establishments rose 89 percent, creating a \$45.5 billion market (22, 23). Money spent on away-from-home foods has sharply risen as well. In 1972, the restaurant/take-out industry represented 25 percent of total food spending, and by 1995 it rose to more than 40 percent (22, 23). Estimated expenditures on away-from-home meals are projected to be as high as 53 percent by 2010 (22).

One possible reason for the increasing trend toward pre-packaged and pre-prepared foods is explained by the increase in dual family incomes. By 1999, 60 percent of women were part of the workforce, leaving fewer than 10 hours per week spent on food preparation (22). This decline in food preparation time compares to an average of fewer than 20 hours per week allotted in the 1950s when only 29 percent of women worked outside the home (22).

In addition to the increasing trend for fast-food and eating out is the rise in convenient food preparations within the home. By 1999, 90 percent of households had

microwaves. But rather than choosing healthy, less processed ingredients such as pre-grated carrots, old-fashioned rolled oats, or ready-to-eat salad greens and vegetables to prepare in microwaves and other time-saving devices, Americans opt for the more processed, energy-dense, less nutritious brand name products. Products such as toaster pastries, frozen pizzas, pre-sauced frozen vegetables and highly sweetened instant oatmeal and cereals carry not only a higher price, but typically higher calories, sugar, sodium and fat. The population's desire for immediate gratification, convenience and minimal planning has replaced the art and skill of creating, preparing and planning healthy meals.

While more foods are being eaten away from the home, nutritional quality becomes a concern. Current data suggest that these foods are often higher in energy, fat and sodium, but deficient in fiber, vitamins A and C and folate. From 1970 to 1994, energy availability increased 15 percent from 3300 calories per capita in 1970 to 3800 calories per capita in 1994 (22). Soft drink consumption closely correlates with the decline in milk intake, particularly in children and adolescents. Between the years 1977/1978 and 1994/1996, soft drink consumption increased 131 percent (22). And, while lower-fat options were introduced, these product lines are barely profitable or popular with consumers. For example, both McDonald's and Taco Bell introduced lower-fat versions of their products in 1991 and 1994. McDonald's introduced a lower-fat version of the Big Mac with its McLean Delux, and Taco Bell added Border Lites, a lower-fat burrito line. However, due to poor sales both of these products were discontinued. Instead, sales increased for more popular items higher in fat, like the McDonald's Big Mac with 570 calories and 32 grams fat and super-sized french fries

with 610 calories and 29 grams fat. Americans simply have an innate preference for fat, sugar and salt and clearly choose to support such food production and availability with their wallets.

When it comes to increased calorie consumption, look no further than food portions: “portion sizes have been increasing both in pre-packaged, ready-to-eat products and at restaurants” (22). Not only are Americans eating more away-from-home meals and snacks, the amount consumed is steadily increasing as well. With regards to soft drinks, a 20- or 32-ounce bottle is considered an individual serving. Compare this portion with that of a Coca-Cola in 1950 when a “king-size” Coke was considered 12-ounces.

Fast-food establishments and restaurants are well known for generous portions, offering the consumer a variety of sizing options ranging from small, medium, large, super-sized or “Biggie.” Foods such as bagels and muffins that used to be 2-3 ounce servings have grown to 4-7 ounces. The traditional size candy bar of one ounce has given way to a new standard of 3.7 ounces, with an even bigger option of “king-size.” Given larger portion offerings by the food industry, evidence suggests that individuals not only eat more, but continue to underestimate the portion size and their intake.

“It makes sense that people will eat more french fries from a ‘super-size’ serving size than from a ‘small’ one, especially if the price for the larger size is cheaper per unit,” because on an individual level, pricing has a strong effect on food choice (22). Price variation alone, without changes in advertising or promotion, has shown to have a significant effect on consumption despite the food being offered. Consumer behavior reacts to price changes equally between nutritionally dense foods or less nutritious, calorie dense items.

Food Marketing and Promotion

In addition to food being simply more abundant, cheap and convenient, advertising and marketing have had an enormous influence on Americans' energy intake. When it comes to food marketing, promotion and education, the message is clear: consume more, not less. Whether consumers drive food sales or the food industry creates the demand, evidence suggests that exposure to advertising, particularly commercials for fast food or convenience foods, increase food sales (4, 22, 24). There is a "distinct correlation between excessive TV viewing and the request, purchase and consumption of foods advertised on television" (4, 25). Taking advantage of consumers' sensitivities to taste, price, convenience and susceptibility to persuasion, the food and food service industry exploit consumer behaviors by annually spending nearly \$11 billion on direct media advertising, second only to the automobile industry (22, 24). Compare this spending budget to the \$29.8 million spent on educational promotions for the "milk mustache" and "got milk?" campaigns, or \$1 million spent on the message to eat "5-a-day," and it's easy to comprehend that the entire 1997 USDA expenditures on nutrition education, evaluation and demonstration was only three percent of the food industry's expenditures that same year (22). The food industry simply has no competition to contrast or argue against the deluge of messages inundating the general public.

In addition, the heavily promoted sweetened breakfast cereals, salty snacks, candy, desserts, fast food and sugar-containing beverages are specifically targeted toward children and adolescents, who further alter family eating and buying habits despite their underdeveloped consumer decision-making skills (4, 23, 26). In the 1989 USA Weekend/Roper Report on Consumer Decision-Making in American Families, children

and adolescents are shown to have a great amount of individual purchasing power as well as influence over family food purchases and decisions. The report's findings suggest that "78 percent of children and teenage youth influence where the family goes for fast food; 55 percent, the choice of restaurant for dinner; 50 percent, the type of food the family eats at home; and 31 percent, the specific product brands that families purchase" (23). In fact, parents identified the "children's desire to eat advertised foods" as a major barrier to changing the family to a more healthy diet (23).

With this in mind and commercialism's goal of increasing consumer demand and economic profit, food and food service industries intentionally develop persuasive marketing strategies aimed at children (23). Using celebrity endorsements, toys and prizes, fun meal packages and playgrounds, children and adolescents are at a disadvantage especially when their weak consumer socialization skills are factored in.

Trends in Popular Culture

Another societal structural change contributing to America's obesity crisis is the strong focus on thinness and physical beauty over health. The growing sense of dissatisfaction with body image, particularly in women, is evident in the popularity of television shows like "Extreme Makeover," which first aired in 2002, followed by Fox's "The Swan" in March 2004, and the increasing trend for cosmetic surgery. The media's contradictory messages further the public's confusion through pressures to be thin, while encouraging the over-consumption of food, as discussed earlier.

While it's unclear exactly how media influences body image, it is evident from women's surveys that "the images portrayed by the media have a powerful, mostly

unconscious, influence on their body image” (27). In particular, “self-critical” women are more susceptible to unrealistic standards and “socially constructed physical ideals” (27). In addition, these women internalize the portrayed norms of popular culture and are less able to “distinguish between external and internal context” (27). This disconnect is revealed in the following quote by Georgia, a study participant, who responded to an interviewer’s question asking how important she felt expectations of society were personally:

I don’t think ... I could give an honest answer even if I tried, on this question, because how much of my own biases towards weight, towards how I should look, come from society? I’ve always grown up in this society... So how much of that really is me, and how much of that is everything that I’ve absorbed like osmosis from society (27).

Advances in Technology

Advances in technology have not only changed our culture’s relationship to food, they have significantly altered Americans’ physical activity, the other side of the weight-balance equation. Unfortunately, the result is a lightened load of energy-expenditure activities creating a more sedentary population. Technologies such as television and other related media, automobiles and labor-saving devices at home and the workplace have all played a role in making Americans less physically fit.

“Americans say that television is the least necessary part of their lives, but devote more time to it than any other leisure-time activity” (22). In 1985, the Americans’ Use of Time Study showed that Americans spent an average of 15 hours per week watching television, while the Nielson ratings estimated the amount in 1999 as 28 hours per week (22). And with the growing number of homes owning televisions, it’s easy to understand

how viewing has become an intricate part of the daily lives of many Americans. In 2000, 76 percent of U.S. households owned more than one television, with a growing number of homes owning three or more sets (22). Many children and adolescents report having their own television in the bedroom. While time spent watching television is associated with an increased prevalence in childhood obesity, at least three studies do not support the same association, or causation, between video game and computer use (4, 25, 26). Therefore, even though it's theorized that this additional sedentary behavior would also displace opportunities for physical activity, a recent study showed no relationship between excess video and computer use and obesity prevalence, thus giving further support that television advertisement may be more detrimental to the public's waistline than the passivity of viewing itself (25).

Automobiles are another technological advancement to displace daily physical activity. Automobiles have replaced the way people get around, even for short distances. Walking and biking, the most common non-motorized sources of transportation have become more a means of leisure-time activity than a mode of transportation. The population's choice for sedentary behavior is reflected in the 29 percent increase in daily miles traveled by vehicle from 1983 to 1990, and in the 11 percent increase in workers commuting by motorized transportation, although the distance has remained relatively constant (22). And this trend doesn't reflect only adults. "Data from the 1995 Nationwide Personal Transportation Survey indicate that less than one-third of children who live within a mile of school walk to school" (25).

Political Policies

Perhaps less obvious, but just as influential on both food intake and physical activity, are the political policies and funding budgets set by the federal, state and local governments. Although the details of government policies and programs extend beyond the parameters of this literature review, a cursory examination is warranted to provoke additional thought and reflection on a significant contributing factor of obesity and physical inactivity.

Government's influence over food intake occurs at the very start of food production, the farm. Agricultural policies, financial subsidies and government supports, have great influence over the type and quantity of agriculture commodities. Unfortunately, the food that health professionals and research continuously advocate isn't awarded the same financial or promotional support. "Each year about \$20 billion of our taxes are spent to subsidize the production of rice, soybeans, sugar, wheat and -- above all -- corn. No such subsidy program exists for fruits and vegetables" (28). In fact, between 1982 and September 2003, prices for fruits and vegetables rose 127 percent compared to only a 57 percent increase for fats and oils, 26 percent for carbonated soft drinks and 50 percent for ground beef (28). The trend of U.S. subsidy policies makes some commodities cheap, but they are often used in products that are contributing to the nation's obesity crisis.

Another area where government is a contributable factor of obesity, specifically childhood and adolescent obesity, is the national educational system. Government and school system officials are simply failing America's youth by exploiting students' health and nutrition in exchange for financial gains. Since the early 1990s, contractual

agreements, or “pouring rights,” have been drawn between school districts and soft drink companies. As part of the “pouring rights” agreement, companies like Pepsi and Coca-Cola gain exclusive selling and promotional rights, while financially-strapped school districts negotiate the best vending deals resulting in large cash settlements. In a landmark agreement, for instance, a 53-school Colorado district signed an \$8 million, 10-year contract with Coca-Cola that included cash bonuses for sales exceeding targets (29). Thus, commercial interests and profits are dependent upon the total amount sold. Allowing such contracts, and the continued sale of competitive foods of minimal nutritional value, is simply irresponsible and abusive, especially when the target audience is young, captive and influential.

Urban and Community Development

Another external factor influencing activity level is the architectural design and urban planning of communities. Buildings funnel traffic flow toward escalators and elevators while stairwells hide behind poorly labeled doors, become narrower and are devoid of any decoration. In three studies designed to examine inexpensive environmental prompts to increase physical activity, stairwell usage more than doubled from six percent to 14 percent when signs were placed near the stairs in an office building. In addition, the use of stairs continued one month after the signs were removed (22). Perhaps more significant was the finding in a third study that showed adding music and artwork to the stairwell increased its usage 39 percent above a baseline level (22).

Going outside building architecture into urban planning reveals the emphasis placed on automobile-oriented design. Without adequate pedestrian and bicycle

pathways, the public's choice to increase transit modes of transportation becomes more difficult when competing with heavy motorized traffic. Beyond the barriers of time and distance for walking and bicycling, the individual is faced with concerns for safety as well. However, there is an opportunity to turn this trend around. In a comparison study between transit-oriented and automobile-oriented neighborhoods, transit-oriented designs resulted in 120 percent more pedestrian and bicycle trips than the automobile-oriented neighborhood (22). Thus, community design does influence commuting behavior and poses a potential positive intervention strategy for healthy lifestyle maintenance.

Although urban planning does impact transportation modes, a contrasting point is the question, "does access to recreational facilities increase active participation?" Although data regarding this topic is limited, three studies don't support what health professionals would like to hear. In one study, no association was found between increased physical activity and the availability of free exercise facilities (22). In two additional studies, data showed that access to free fitness facilities did not increase individual use of the facility or overall activity levels (22). Although public park and recreation facilities are less than the number recommended, this early set of data would suggest a waste of government funding to propose more facilities given the public's underutilization of those already in operation (22).

Whether community design significantly impacts the increase in the population's activity is debatable. However, early evidence does suggest that increasing the public's opportunity along with adequate advertisement and promotion of these activities is promising and worthy of additional research.

Diet and Fitness Industry

The last societal structure change influencing obesity comes from the diet and fitness industry itself. Standard therapy provided by commercially available weight loss or fitness programs mainly involves calorie reduction, increased energy expenditure or a combination of the two. Other alternatives gaining attention are pharmacological intervention aimed to reduce hunger, stimulate satiety or reduce fat absorption, and surgical management (30). Regardless of the choice in therapy, these programs generally employ an action-oriented approach. Using a cookie-cutter tactic, however, does not consider the individual's needs or what might work best in variable situations. True to the economics of business, the relationship with the consumer ends at the point of sale.

Although data regarding the effectiveness of these programs are limited, the patient's long-term success is considered poor. Many individuals regain any initial weight loss with a similar amount, or more, within the following year or two by reverting back to previous diet or exercise habits (30).

This again raises the question: what makes maintaining a healthy weight and a physically active lifestyle difficult? For the most part, Americans face very similar environmental and societal influences. So, what allows one person to maintain a healthy lifestyle while others struggle? Perhaps the weight maintenance equation is a function of not only energy intake and energy expenditure, but interpersonal factors as well.

Self-esteem/Self-efficacy

An individual's self-esteem or self-efficacy plays an important role in successful long-term behavioral change. This particular internal influential factor is defined as the

degree of competency or confidence a person feels in completing a task (31).

Individuals reporting high self-efficacy “persist longer in the face of obstacles, exhibit more effort, attribute failure to strategy deficiency rather than to ability or effort, and achieve skill proficiency at a higher level” (31). It influences an individual’s decision to apply such self-regulating strategies as goal-setting, self-monitoring and evaluation, support and information seeking, and environmental structuring -- essential tools for making lasting change (31). Rather than fall victim to fashion, beauty and diet industries, self-confident individuals (particularly women) hold the personal strength to resist social norms and refuse to participate in the “game” the media portrays (27).

In reference to children’s purchasing decision-making skills described earlier, self-efficacy and self-regulating strategies may better be replaced or supplemented with consumer socialization, the continuous process by which children and adolescents develop the ability to “select, evaluate and use information relevant to purchasing” (23). Without such skills, America’s youth will continue to fall victim to the influences of environmental factors, particularly advertisements.

Spirituality

At first glance, religion would appear to have a positive effect on an individual’s good health in numerous ways: social support, stress reduction and supporting theology.

Religious participation offers social support by the very nature of its membership, a component often cited as having a positive correlation with successful weight loss. Beyond just the inner circles of friends and family, the entire congregation may serve as an even larger support system.

When it comes to stress, body weight is affected as individuals often turn toward food for comfort or to cope. Religion may counteract this negative-coping method by giving the individual a healthy alternative, to avoid stress-induced eating.

Lastly, religion's own theology supports a healthy lifestyle, often devoid of smoking, alcohol and gluttonous acts, to include obesity. Regardless of the religion, each has some reference in its teachings discouraging excesses. For example, Catholics associate fasting with purity, Judaism views the human body as created in God's image, and Protestants learn that the body is the temple of God (32).

This sacred view of the human body would give the impression that religious individuals are healthier and more physically active than non-religious individuals. However, research on religion's relationship with body weight is limited, and available data are mixed. Although more research regarding religion and body weight is warranted, there doesn't seem to be significant association between religious practice and weight loss.

With this said, however, individuals successful with long-term weight maintenance do report an "inner transformation" (19). Further evidence also supports this "revelation," as individuals who have self-changed, without the help of formal intervention, report not only experiencing a change around them, but also inside them (20). Self-changers often reply to the question how and why they did it with, they "just decided" (20). Thus, although formal religious practice doesn't correlate to long-term healthy behavioral change, there is indeed an inward switch that goes off enabling the person to reconstruct how they react to the variable influences that contributed to their unhealthy behavioral habits.

Individual Behavior Choices and Personal Responsibility

Aristotle wrote, “We are what we repeatedly do. Excellence, then, is not an act, but a habit.” And yet, one of the most overlooked factors contributing to America’s obesity epidemic is the population’s habitual choice to consume excessive calories and consistently remain physically inactive. There is no social structure forcing individuals to succumb to excess consumption and sedentary lifestyles, but the search for obesity solutions fail to recognize the individual adult as the primary contributor and, hence, the first target for intervention.

This trend in shifting blame is also seen as America’s propensity for litigation and claims of “it’s not my fault” has led to recent lawsuits against major food companies. No longer are individuals who engage in excessive behavior called gluttons, but instead are considered victims (33). Perhaps the most publicized lawsuit, which inspired the Oscar-nominated documentary, *Super Size Me*, involved McDonald’s, which faced two New York teens claiming the chain’s burgers and fries caused their health problems.

“Ultimately, good eating habits [and physical activity] are a matter of personal and parental responsibility” (33). However, this concept of choice seems to be more difficult for the millions of obese Americans and thus raises questions about some individuals successfully maintain healthy behaviors while many struggle with consistently repeating the behavior change cycle of start, maintenance, relapse, start, maintenance and relapse. If “successful long-term weight management ultimately depends on the ability of patients to change their behaviour patterns, particularly with regard to diet and exercise,” then what are the keys to success (34)?

The Stages-of-Change Model

Given the complexity of this issue and human behavior, the Stages-of-Change Model, or “wheel of change,” provides a relatively straight-forward approach to restructuring an individual’s lifestyle. Introduced in 1983 by James Prochaska, Ph.D., and C.C. DiClemente, their theory suggests individuals move through. Or, often, circle around a series of developmental stages: pre-contemplation, contemplation, preparation/determination, action, maintenance and relapse. Termination, a final exit from the change model, occurs when motivation and commitment toward changing behavior is formalized (18, 20). The following figure illustrates the change process (20).

Figure 2: The Stages-of-Change Model

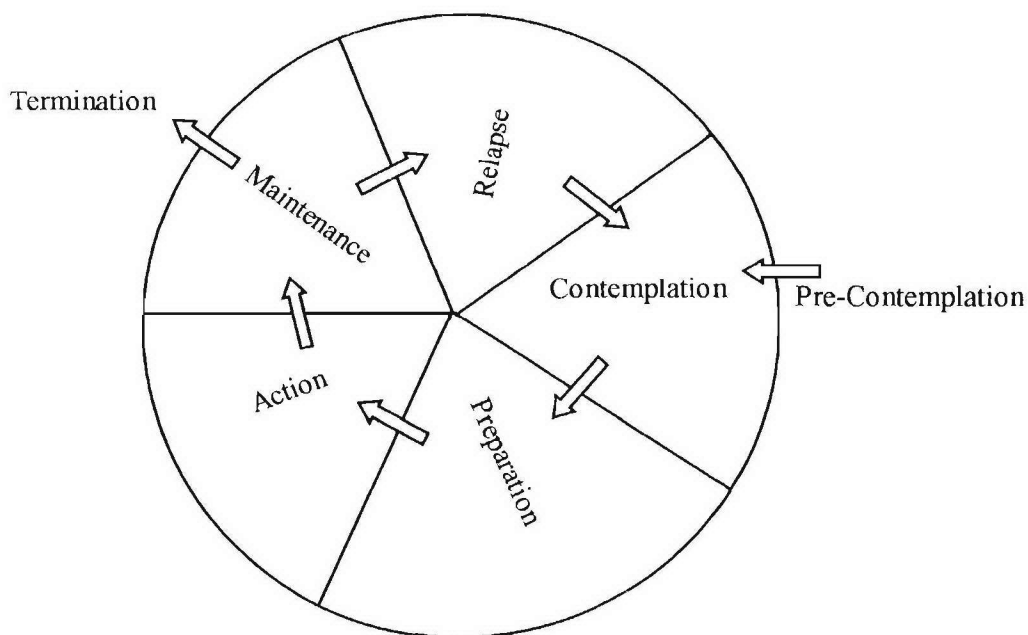


Figure Adapted from *Motivational Interviewing: Preparing People to Change Addictive Behavior* 1991.

In the pre-contemplation stage, individuals are characterized as unaware that there is even a problem or need to change. Pre-contemplators rarely seek treatment and are often surprised, not defensive, when approached about the problem (20).

Contemplators are individuals who recognize a problem, think about making a change, but delay taking action. The future's uncertainty often leads to the individual becoming complacent in this stage for years, only thinking about the problem and never taking action to do something about it. The contemplator often raises reasons to make a change, but then also justifies reasons for rejecting it (18, 20).

The third stage of Prochaska's model is preparation, or determination. In this phase, the individual has taken small steps toward making a change and is ready to take action within 30 days (18). Individuals in this stage are good candidates for behavioral health programs.

The action stage is where the individual makes considerable behavior changes, and is frequently the focal point for many health programs. Here the person consistently meets recommendations set by health professionals. For example, a woman goes from exercising once per week to walking briskly three times per week in the lower range of her target heart rate zone.

The fifth stage of the Stages-of-Change Model is maintenance, a challenging six-month period where individuals work towards permanently establishing the change in behavior and avoiding relapse, the sixth stage (18, 20).

Although the inclusion of relapse as a permanent stage in the model may indicate that its occurrence is expected, it's not meant to encourage relapse. Instead, including a

relapse phase poses a more realistic reflection of the normal minor and major “slips” that come with changing habits (20).

Given the statistics on overweight/obesity and inactivity, an exiting point, or termination, appears to be an elusive and impossible goal. Termination “occurs when there is zero temptation to engage in the problem behavior,” and the individual’s new lifestyle overshadows as if the old never existed (18).

Influential Maintenance Factors and Successful Strategies

“People change in many different ways and for a multitude of reasons” (20). But when it comes to maintaining weight loss or a physically active lifestyle, most Americans fall short of even the most simple of recommendations. However, regardless of the dire obesity statistics and the overwhelming societal and individual influences on behavior, some individuals are successful. Hence, the second question posed by this literature review: why are some individuals successful while many struggle at repeating the phases within the Stages-of-Change Model?

To answer this question, the most convincing evidence comes from the National Weight Control Registry (NWCR). Although comprising a small percentage of the U.S. population, 4,500 participants have succeeded in keeping off lost weight, and offering proof that long-term weight loss is possible. Qualifying as a participant in the National Weight Control Registry, each individual has lost at least 30 pounds and kept it off for a minimum of one year. Currently, as a whole, these individuals have lost an average of more than 65 pounds and have kept it off for five and one-half years (19, 35).

Their secret? According to the NWCR, no one diet or behavior stood alone as the “magic bullet,” or the single key for success. Rather, a variety of methods and daily habits were employed. Self-regulating behavior and physical activity strategies that a majority of participants used in maintaining long-term weight loss are discussed below (35).

- Ate a low-fat, high carbohydrate diet -- 24 percent of total calories from fat, 56 percent from carbohydrates, and 15 percent from protein. Few (less than one

percent) chose the currently popular low-carbohydrate diet for weight loss maintenance.

- Four to five meals eaten each day.
- Daily breakfast.
- 60 to 90 minutes of moderately intense daily physical activity was reported as “an important component of their weight-maintenance regimen” (35). Walking was mentioned as the most common form of exercise, while some chose a combination of walking and biking, swimming, or aerobics.
- The last factor employed by many of the NWCR registrants is the self-regulating behavior of self-monitoring, or the “deliberate attention to some aspect of one’s behavior” (31). With regards to weight loss, examples of self-monitoring include weight checks and/or keeping food records. For NWCR registrants, weekly weight checks were most popular, with some individuals checking daily (35).

While NWCR registrants chose self-monitoring, another well established self-regulating strategy proven effective in weight maintenance is goal setting. “Research has shown that individuals who set specific, realistic, proximal, and strategic goals have higher self-efficacy perceptions and are more likely to maintain a behavior change” (31).

In addition to self-monitoring and goal setting, other self-regulating behaviors shown to positively impact maintaining healthy behaviors are support and information seeking, self-evaluation, and environmental structuring. Although utilizing all of these tools isn’t necessary, having the self-efficacy to apply the ones that work best is essential

to successfully lose, maintain and manage weight, especially in the face of difficult times (31).

The success of these strategies is further supported by the Herrmann Brain Dominance Instrument (HBDI), a 120-item, multiple-choice questionnaire designed to evaluate thinking styles (19). Preliminary findings by cultural anthropologist, Inga Treitler, PhD, suggest that individuals are automatically inclined to process and react to information corresponding to four quadrants of the brain: quadrant A (upper left), quadrant B (lower left), quadrant C (lower right), quadrant D (upper right) (19). Based on results of NWCR members, quadrant B thinking styles were associated with the most significant weight losses. Characteristics associated with quadrant B thinking include controlled, methodical, disciplined and structured. They follow a plan, are punctual and use a timetable or calendar for appointments -- characteristics helpful in carrying out the self-regulating behaviors shown to lead to healthy behavior change (19).

Practical Public Application

Potential solutions for obesity are as multi-faceted as its contributing and influential factors. But, just as various external and internal factors were influential in contributing to obesity's rise to epidemic status, these same factors can be just as influential in contributing to solving America's current obesity crisis. Thus, the goal, and challenge, for dietitians and health professionals is to change one individual, one workplace, one school, one political policy and one popular trend at a time until collectively they resolve to reduce obesity's growing rate.

The first line of defense in solving obesity begins with the individual's self-efficacy and self-regulating behaviors. As the National Weight Control Registry members have proven, maintaining a healthy weight and active lifestyle is possible, but the individual must be ready (Stages-of-Change Model), confident (self-efficacy) and competent (self-regulating behaviors) to make the necessary changes. Health professionals would better serve clients by relinquishing control of their disciplined-focused, action-oriented approaches, and learn more about the person's psychology and situation. From this author's experience, the true root cause of the issue is less about nutrition and fitness, and more psychological in nature. Appropriately educating and coaching clients to stand strong against difficult issues empowers them to make not just a good decision, but perhaps the right one. Research provides findings that behavior undeniably plays a central role in many of the world's health problems. Thus, intervention's main focus should be changing individual behavior. "To change your life,

you must change the way you think. Every behavior is motivated by a belief, and every action is prompted by an attitude” (36).

Although societal trends, political policies and commercial interests are less likely to change quickly, there are promising programs and interventions in the works. As health professionals, the next goal is to actively promote and market these successful strategies with the same intensity as food and food service marketers. A great idea is even greater when shared with others. By implementing or developing further upon successful programs and strategies, then over time the strongly influential external factors that once led to obesity can in turn lead to healthier and more active lifestyles. Discussed below are practical ideas and programs which, put into practice, place the population one step closer to a healthier America.

Self-regulating Behaviors – Individual Intervention

- Self-monitoring and self-evaluation:
 - Regularly check weight, body fat or waist measurement.
 - Keep detailed food records.
 - Maintain a physical activity log.
 - Appropriately monitor blood glucose levels, blood pressure, total cholesterol, HDL cholesterol and LDL cholesterol and triglyceride levels.
- Information and support seeking:
 - Subscribe to credible behavior, nutrition and fitness journals or newsletters.
 - Read books or listen to audio-books on related topics in the car, on walks, working in the yard or exercising at a gym.

- Buy a healthy cookbook or take a healthy cooking class.
- Join like-minded clubs, attend conferences or seminars or take a class.
- Research reliable Internet sites or community programs.
- Join a support group through personal contact, telephone or the Internet.
- Confide in a supportive family member or friend.
- Invest in sessions with a registered dietitian, fitness trainer, behavior counselor or counseling group.
- Environment structuring:
 - Create a healthy eating environment by stocking the house and work station with convenient, healthy foods. Make fresh fruits and vegetables available for snacking. Prepare leftovers for lunches, instead of eating out. Create freezer meals for when crunched for time. Develop family theme meal days to discover new and healthy cultural foods.
 - Organize the day, the week, the month and plan for physical activity. Exercise that is planned is more likely to be accomplished. There are 1,440 minutes in a day; the goal is to set aside at least 30 minutes daily for moderate to intense physical activity.
 - Create and plan daily and weekend active family fun time and vacations.
 - Increase daily activity where possible; a little adds up over time. Take the stairs instead of the elevator or escalator. Walk or ride a bike for short-distance travel. Park farthest from entrances to work, the store and other places visited.

Urban and Community Development – School-based Intervention

When it comes to fighting childhood and adolescent obesity, many successful programs already exist, providing resources and materials for parents, caregivers, school officials and communities. Ultimate responsibility lies with adults, who are charged with forming healthy lifestyles in the best interest of the child, and not as a reaction to economic gain, popular trends or the simple wants of children. Below is a list of program websites and a brief description of what they offer.

- Team Nutrition. www.fns.usda.gov/tn

An initiative of the USDA Food and Nutrition Service to improve children's lifelong eating and physical activity through training and technical assistance for foodservice workers, nutrition education for children and caregivers and healthy eating and physical activity support for schools and the community.

- Bam! Body and Mind. www.bam.gov

An interactive website especially designed for kids. A place where they can go to get answers to questions, with no questions asked. The site offers fun, creative games and quizzes that educate on such topics as physical activity, stress, problem solving, personality and nutrition. There's even a Teacher's Corner.

- Eat Smart. Play Hard. www.fns.usda.gov/eatsmartplayhard

The Eat Smart. Play Hard. campaign is about making children healthier through kid-tested materials that are fun and informative.

- Action for Healthy Kids. www.actionforhealthykids.org

A nationwide campaign focused on improving the health and educational performance of children through nutrition and physical activity in schools. This site offers Fact Sheets, additional resources, a database of “What’s Working” and more.

Urban and Community Development – Work-place Intervention

- Promote walk or exercise breaks instead of coffee breaks or smoke breaks.
- Reduce employee stress with a 10-minute back massage program.
- Encourage stair use with directional signs, educational stair and exercise tips, decorated stairwells and music.
- Commit to healthier food choices in work place vending machines, beverage machines and catered functions.
- Initiate a corporate wellness program.
- Offer educational lunches on topics such as fitness, nutrition, behavior change and stress reduction.

Societal Trends – Political Policy and Cultural Trends Intervention

- Transform food availability by discontinuing subsidies for less healthy agricultural commodities and support subsidies for healthier, less processed foods such as fruits, vegetables and whole grain products.
- Appropriately fund and regulate the educational system to eliminate or limit pouring rights contracts and competitive foods.
- Implement mandatory physical activity programs in the educational system, with appropriately trained staff providing oversight.

- Fund and design communities that encourage non-motorized forms of transportation.
- Regulate media advertisement focused toward children and adolescents.
- Adequately fund healthy campaigns so that promotion and marketing at least mimic that of food and food service industry.

Thomas Edison is quoted as saying, “The value of a good idea is in using it.” Nothing speaks more true than with the existing ideas and programs promoting good nutrition, physical activity and healthy lifestyles. And, through the consistent application of these successful strategies at the individual, community and national level, the solution to obesity is completely possible.

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