Comparison of Calcium and Weight Loss Information in Teen-Focused versus Women's Magazines over Two Four-Year Periods (1986-1989 and 1991-1994)

by

Mary Korinis

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APPROVED:

Mary K. Korslund, Ph.D. Chairman

Gabriella Belli, Ph.D.

Joyce M. Donohue, Ph.D.

Janet M. Johnson, Ph.D.

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(ABSTRACT)

Specialty magazines play a role in shaping how females of all ages view the world and themselves. This world for teens is often focused on dating, fashion and the evolving and conflicting issues of self-confidence and body image. Home, health and career messages predominate women's magazines. A young woman retains the opportunity to increase her bone density through her late twenties at which time bone density holds steady until the onset of menopause. The 1989 calcium Recommended Dietary Allowances (RDA) were increased from 800 mg/d to 1200 mg/d for only one female age group: 19-22 y, which was extended to 19-24 y to maximize the opportunity for peak bone accretion. In recognition of this change and the inverse relationship that exists between bone mass and body weight, the frequency of calcium and weight loss content was compared between teen-focused magazines (Seventeen and Mademoiselle) and women's magazines (Good Housekeeping and Ladies Home Journal) for two four-year periods (1986-89 and 1991-94). Women's magazines were found to have 20 times the calcium coverage in overall

area (ads, articles and columns) and 40 times the number of calcium ads as found in teen-focused magazines. In contrast, teen-focused magazines published 1.4 times more weight loss area than was found in women's magazines. The calcium message has primarily been offered to women past their best opportunity to affect bone mass. There was no impact on calcium coverage for either magazine type due to the release of the 1989 RDAs.

DEDICATION

To my grandparents, Edmund Andrew and Emma Schultis Yochum.

ACKNOWLEDGMENT

"Research is never a solo flight - an individual excursion.
It begins by researchers communicating their thoughts, their plans,
their methods, their objectives for others to read, to discuss, to act upon."
Paul D. Leedy

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Background

For over a hundred years, women's magazines have played an important role in shaping how women view the world and themselves (Pratt and Pratt, 1995). This world for adolescents is focused on dating, fashion and the evolving and conflicting issues of self-confidence and body image. The prospects of aging and osteoporosis are remote and abstract issues. But it is precisely then that adolescents are presented with a great advantage, though limited in time, to maximize bone density to carry them safely through subsequent decades. Young women's magazines have a voice and opportunity beyond reporting current trends to prepare readers for their best possible futures.

Osteoporosis is the most common skeletal disorder in the United States affecting about 24 million individuals, 80% of them women. Thirty percent of women will have at least one silent spinal fracture by the age of 65 y. By the time they reach age 80 y, as many will have suffered a hip fracture which is never silent and often a catastrophic and terminal event (Astrand, 1992). There was only one change for calcium in the 10th Edition Recommended Dietary Allowances (RDAs) released in 1989. In recognition of the evidence that peak bone mass is not achieved until the age of 25 (RDA, 1989), calcium RDAs were increased for the 19-24 year age range. The age range for maximum calcium intake in females was also expanded by two years. It was 11-22 years in the 1980 RDAs and 11-24 years in 1989 (Table 1).

Growing children and adolescents, unlike adults, need to remain in positive calcium balance to meet extra skeletal demands with calcium needs greatest from ages 9-17 y.

Puberty is an intensely anabolic period, approximately 37-45% of the total skeletal mass of adults is accumulated during this time. From its onset to the cessation of puberty, adolescents are gaining bone mass at an accelerated rate of approximately 8.5%/y (Matkovic, 1991).

Table 1. 1980 and 1989 Recommended Dietary Allowances for Calcium (RDAs).

Age (years) and Sex Group	1980 RDA for Calcium[1] (9th Edition)	1989 RDA for Calcium[1] (10th Edition)
Infants		
0.0-0.5	360	400
0.5-1.0	540	600
Children		
1-3	800	800
4-6	800	800
7-10	800	800
Females		
11-14	1200	1200
15-18	1200	1200
19-22	800	
19-24		1200
23-50	800	
25-50		800
51 +	800	800
Pregnant	+ 400	1200
Lactating	+400	1200
1st 6 months		1200
2nd 6 months		1200

Source: Food and Nutrition Board, National Academy of Sciences -- National Research Council

[1] mg/d

Though the bone growth rate declines with age, women are now thought to retain the potential for positive bone remodeling through their late twenties at which time bone density holds steady until the onset of menopause (Snow-Harter, 1992). The greater the bone density acquired by young adulthood, the longer the period of bone loss that is required before the fracture threshold is reached. Osteoporosis, which literally means porous bones has been referred to as a "juvenile disease with a deferred outcome" {National Institutes of Health (NIH), 1994}.

Women's magazines address a variety of issues relevant to a general audience including style, food and health. In specialty magazines targeted to a younger fashion-conscious population, achieving an idealized and often unattainable size becomes the foundation upon which glamour is sold. Women of all ages have been bombarded by the media with an advertising blitz of seemingly mixed messages regarding body image and health.

An increase in the incidence of eating disorders over the last several decades has been shown to coincide with a decrease in women's perceived ideal female body weight as portrayed in magazines such as Playboy and by Miss America pageant contestants. (Wiseman et al. 1992). Although most young women are exposed to the same media images, the perceived messages can be dangerous for adolescents still developing confidence and formulating an identity. Internalization of a thin ideal with unrealistic body-image goals has produced eating pathology even in teens satisfied with their weight as a consequence of peer group influence (Stice et al. 1994). For those less satisfied with their body image, fashion magazines have the potential of reinforcing unhealthy habits. Crash dieting becomes the means to emulate the current popular look.

Hypotheses

Because of the time-limited opportunity for a young woman to maximize her bone density, the inverse relationship that exists between bone mass and body weight, and the widescale media emphasis on an idealized body image, the following information areas, as displayed in Table 2, were analyzed for content. Area A represents the bone/calcium content in women's magazines. Area B represents the bone/calcium content in teen-focused magazines. Area C is the weight loss content in women's magazines while area D represents the weight loss content in teen-focused magazines.

It was hypothesized in this study: calcium coverage in women's magazines would exceed that found in teen-focused magazines and weight loss coverage in teen-focused magazines would exceed that found in women's magazines. Area A would be greater than area B and Area D would be greater than area C. Furthermore, the revised 1989 RDAs for calcium would not result in increased coverage in teen-focused magazines. And women's magazines would continue to promote calcium in articles and advertising even though calcium RDAs did not change for females 23-50 y and 51 y + (Table 1).

Table 2. Study Design and Expected Study Outcome[1].

Content	Women's Magazines	Teen-Focused Magazines
Bone / Calcium	A	B
Weight Loss	C	D

[1] The expected outcome is that A > B and D > C.

Thesis Question

To what extent have teen-focused and women's magazines balanced coverage for weight loss with calcium nutriture? One way to answer this question would be to measure allocated space in print media for these two female issues. Do teen-focused and women's magazines allocate the same amount of space to weight loss information as is allocated to the promotion of strong bones? It is possible the two populations are receiving different messages.

Public perception of calcium's value for postmenopausal women has remained high since the 1984 NIH Consensus Conference on Osteoporosis. Conference participants recommended at least 1000 mg/d dietary calcium for all adults including postmenopausal women (> 50 y) on estrogen and 1500 mg/d for those not taking estrogen replacement therapy (NIH,1984). The critical importance of building strong bones during adolescence was also presented at the conference. Their discussions, however, were not reflected in RDA calcium changes for both populations. Only one age group (females 19-22 y at 800 mg/d) was increased to 1200 mg/d and the age range was expanded to include those 19-24 y (RDA, 1989). And because teen-focused and women's magazines represented popular interest trends rather than official recommendations, they may not have changed their calcium coverage to reflect the 1989 RDAs.

Relevance

The four magazines proposed for examination were Good Housekeeping, Ladies Home Journal, Seventeen and Mademoiselle. Their track record for reader loyalty speaks to their popular appeal. Good Housekeeping was launched in 1885; Ladies Home Journal, 1883; Mademoiselle, 1935; and Seventeen, 1944 (Gale Directory of Publications and

Broadcast Media, 1995). The first two magazines' initial focus of home-centered versus fashion has remained to this day. Given the capricious nature of teens, Seventeen and Mademoiselle have been particularly successful at identifying relevant adolescent issues and maintaining teen readership. These two magazines have the potential to influence the health of readers decades after readership has ceased. Timely messages, once received, shape health and dietary habits for a lifetime.

If study data indicate that the bone mass message is not getting to young women while they are still able to affect the outcome, then health professionals, educators, parents, magazine editors and especially young women themselves may want to focus their efforts in this direction.

REVIEW OF THE LITERATURE

Etiology and Clinical Features of Osteoporosis

Osteoporosis is classified as primary (Type I) or secondary (Type II) based on etiology. Type I is the most common, occurring in women between 45 and 55 years of age in whom bone loss is accelerated due to estrogen deficiency. Type II affects both men and women over age 70. Bone loss is not related to a hormone deficiency but occurs at a slow steady rate and, for reasons unclear, seems to be a physiologically normal part of aging (Tolstoi and Levin, 1992).

Bone is composed of a collagen-rich organic matrix impregnated with the nutrients calcium and phosphate. Calcium participates on demand in a large number of vital physiological functions, with the maintenance of serum calcium taking precedence over skeletal homeostasis. Bone is a metabolically active tissue that is always in flux at surface sites known as multicellular units. Ten percent of bone is being remodeled at any one time, taking approximately 100 days to complete a cycle (Tolstoi and Levin, 1992).

The two major forms of bone are compact cortical bone which forms the external skeleton and highly porous trabecular bone which consists of plates that transverse the internal cavities of the skeleton. Vertebral bodies contain predominately trabecular bone, while the proximal femur contains primarily cortical bone (NIH, 1984). Bone grows through the secretion of collagen by osteoblast cells which repair and fuse bone while osteoclasts resorb mineral matrix. Osteoblasts and osteoclasts are synchronized to work in unison. Remodeling occurs when bone demineralization, due to osteoclast activity, exceeds bone growth and a negative calcium balance ensues (Diet and Health, 1989).

As the estrogen levels decline in women with age, bone adjusts its mass downward. A similar change occurs during prolonged bed rest or weightlessness, when sizable quantities of calcium are being released from the bone. No amount of dietary calcium can replace what is lost (Heaney, 1991). Bone loss is not due to calcium deficiency but to accelerated osteoclastic activity in labile trabecular bone. Fractures can occur silently or after minimal trauma. Early bone loss is first revealed in the vertebral bodies of the spine which are 70% trabecular and can be observed by dual photon absorptiometry (Snow-Harter, 1992).

At the onset of either a spontaneously occurring or surgically induced menopause, there is accelerated bone loss of 2-5% which continues for 10 years or longer. As estrogen-dependent bone is resorbed, a woman past the menopause will again be responsive to dietary calcium. Type II osteoporosis which is more amenable to dietary intervention is equally present in both genders over age 70 and occurs at a slow steady rate of 0.2 - 0.5% per year (Diet and Health, 1989).

Dietary Calcium Intake

There has been widespread promotion for using dietary calcium to prevent osteoporosis. Contributing to the public interest in calcium were the NIH Consensus Conference on Osteoporosis findings released in 1984. The Conference addressed maximizing adolescent bone mass as the best defense. A recent 1994 NIH Consensus Conference on Optimal Calcium Intake reiterated these same recommendations and presented additional data supporting the importance of maximum calcium intake during adolescence and young adulthood to reduce osteoporosis risk.

Although high calcium intake has a minimal protective effect against bone loss in the immediate postmenopausal period (five years following menopause), conference participants recommended calcium intakes of 1000 mg/d for all adults including postmenopausal women (> 50 y) on estrogen and 1500 mg/d for those not taking estrogen replacement therapy (NIH, 1984, 1994).

The yardsticks for measuring dietary calcium intake are the Recommended Dietary Allowances (RDA). RDAs first published in 1943 to "provide standards serving as a goal for good nutrition" were intended to be a guide for healthy population groups and not requirements for specific individuals (RDA, 1989). The 1989 Recommendations were unchanged for postmenopausal women. Recommendations were increased from 800 to 1200 mg/d for females 19-24 y. In addition to increasing the calcium RDA, the age range was expanded for young adults from 19-22 y in the 9th Edition to include 19-24 y in the 10th Edition RDAs. The highest calcium allowance for females (1200 mg/d) now spans adolescence to young adulthood ages 11-24 y (Table 1).

Prevention: Maximizing Adolescent Bone Mass

In spite of higher calcium retention (396 mg/d), adolescents are at greater risk for calcium deficiency than children (114 mg/d). The risk of negative calcium balance results when an adolescent's greater (than that found in children) obligatory calcium urine loss is accompanied by a low calcium intake of < 500 mg/d (Matkovic, 1992). The threshold calcium intake for adolescents (ages 9-17 y) is thought to be around 1480 mg/d. Threshold intake is defined as the level above which continued calcium intake does not contribute to denser bones (Matkovic and Heaney, 1992).

Several studies have addressed the status of calcium nutriture in females. The FDA's Total Diet Study found the diets of adolescent girls and adult women to be below the RDA for calcium. The diets of girls 14-16 y averaged 61.1% and women 25-30 y averaged 71.8% of the RDA for the years analyzed, 1982-1986 (Pennington et al. 1989). The 1987-88 National Food Consumption Survey found calcium intake remained below RDA's for adolescent girls. Mean intake, for white females 12-19 y, was 820 mg and for black females 12-19 y, 637 mg. (USDA, 1993). On a smaller scale, a cross-sectional study examined food records for 49 females aged 8-18 y (Sentipal et al. 1991). Researchers determined two of every three girls (8-10 y) met the RDA for calcium; but only one of every six girls (11-18 y).

A placebo-controlled longitudinal trial of 94 12-year-old girls, which provided supplements to increase intake to 80% to 110% of RDA, found increased bone density of 1.3% per year greater than that for controls (Lloyd et al, 1993). Even this small increase could translate into a lifetime benefit. A significant difference in hip fracture rates have been observed between two matched adult populations who differed in peak bone mass by only 6% (Matkovic et al. 1979). Other studies have shown that bone mass can increase until 35 years of age, well after linear bone growth has ceased (NIH, 1984). In analyzing over 400 calcium balance studies from published reports, Matkovic (1991) observed spinal bone retains the potential of increasing approximately 10% between the ages of 18 and 30 y.

The synergistic effects of poor calcium intake and low body weight affect the length of the bone accretion period. The bone accretion window is also influenced by age and

environmental history (Recker et al. 1992). Peak bone mass for a man will be approximately 30% higher than for a woman and 10% higher in blacks than in whites. Small-boned Caucasian and Asian women with contributing lifestyle factors (alcohol abuse, sedentary life style, low calcium intake and history of estrogen deficiency) would be at greatest risk for a narrow bone accretion window (NIH, 1984, 1994).

Eating Disorders and Sports

While adolescent females enter puberty with calcium requirements at their peak (1200 mg/d), food intake and consequently calcium consumption during this period is often sporadic and given to fads and fetishes. Approximately one-half of adolescent girls have been found to be dissatisfied with the shape of their bodies and more than two-thirds with their weight. This dissatisfaction increases their odds of engaging in dieting, fasting, self-induced vomiting and the use of diuretics and diet pills (Moore, 1993). There exists a very wide variation in the prevalence and definition of eating disorders for females. Pathogenic weight control habits range from poor nutritional choices to bulimia and anorexia nervosa with body size distortion common to both conditions.

Dieting is accepted and viewed as a normative "rite of passage" for adolescents with little to no consideration given to metabolic effects. It was originally believed that overeating and binging lead to dieting, but researchers have shown this order is reversed. Controlled experiments have linked forced dietary restraint to subsequent binge eating and an increased risk for development of other eating disorders. This risk is amplified if additional psychopathological (non-weight) symptoms are also present (Neumark-Sztainer, 1995).

Bulimia and/or anorexia nervosa are estimated to affect 20% of all females between the ages of 13 and 40 when self-reported by a questionnaire. However, prevalence studies on eating disorders found only 8% of symptomatic females met the diagnosis of bulimia when defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) (Stein, 1991). This widespread problem more often than not escapes detection and treatment.

Because of the considerable variation in estimates of prevalence and the large number of anorexics who also engage in binge eating, new diagnostic criteria has been proposed for the revised DSM-IV. Restricting anorexics (ANRs) and bulimic anorexics (ANBs) as defined by Emerson and Stern (1993) are two defined subtypes that share many personality characteristics. They differ, however, in restriction of food or fasting (ANRs) versus alternating restriction with bouts in binging and purging (ANBs). Both show unusually high rates of subaverage bone density, suggesting a risk for future osteoporosis. Clinically significant bone loss was present in 40% ANBs compared to 29% ANRs. In general, bulimic anorexics have the more severe course of illness and poorer prognosis (Emerson and Stern, 1993).

Young women involved in organized or recreational sports are at greater risk for eating disorders. Studies show 15% to 62% of female athletes exhibit unhealthy weight control behaviors, including calorie restriction and over-training. Researchers have found reduced bone density and estrogen levels in amenorrheic runners (mean age of 25.2 y) whose calcium consumption was 886 mg/d, but whose energy, fat and carbohydrate intakes were below normal (Nelson, 1986). Dhuper et al. (1990) noted a correlation between estrogen

status and bone density in adolescent dancers. However, that correlation did not remain significant when the data were controlled for weight.

In 1995 The United States Naval Academy began testing all plebes (freshman) for history of eating disorders in an effort to gauge the effect service life has on "this quiet but growing problem". Approximately 500 of the 4000 member brigade were female. Academy physicians determined cadets are particularly at risk for eating disorders because all midshipmen are required to participate in sports and 35% of the men and 50% of the women play on a varsity sports team. Athletic competition poses the dual risks of over-training while maintaining prescribed Academy body fat standards (Argetsinger, 1995). Osteoporotic bone loss, which is not completely reversible, has been found in female athletes as early as their teens and twenties (Nattiv and Lynch, 1994).

Since the 1984 NIH Consensus Conference on Osteoporosis, numerous studies have confirmed their recommendation of weight bearing exercise as a means of preventing age-related bone loss (NIH, 1984). Bone tissue, in spite of society's bias against obesity, responds favorably to the metabolic advantage of extra weight by enhancing osteoblast cell activity and improving mineral density. Within pre-set genetic boundaries, spinal trabecular bone has been shown to increase with body mass (Dalsky et al. 1988). However, weight bearing exercise will have little positive effect if accompanied by over-training and restrictive eating.

Teen Demographics

In 1993 there were 13.7 million female teens in the United States, 10.4% of all females. In the next 10 years, that number is expected to grow to 16.0 million, a 16.6% increase (Bureau of the Census, 1990). Today's female teen is more independent and responsible for household activities such as grocery shopping and cooking. In 1975, 37% of teens lived in a "traditional" American family with a working father and mother who stayed home. In 1992 that percentage dropped to 17% (Bureau of the Census, 1990).

A 1994 Rand Youth Poll found 90% of female teens ranked food the number one household purchase over which they had influence, with 66% regularly shopping for family groceries. Thirty-six percent of teens made themselves meals in 1993, up from 13% six years earlier. With so many mothers working, teen daughters are the ones who have the time to go out and do the food shopping, prepare family meals and personally affect their future bone health.

Nutritional choices are influenced by family, economics, peers, broadcast and published media messages. Advertising research has shown females to be more influenced by nutritional appeals than men, particularly by information that appears in print (Hickman et al., 1993). One influence, the teen-focused magazine, has been shown to capture a wide teen audience comparable in size to the number reached by prime time television. In 1993 audience share of females 12-19 y was 7,075,000 for "Beverly Hills 90210", 5,647,000 for "Blossom" and 6,183,000 for "Roseanne". Seventeen Magazine, the leading publication for this subset, reports a 6,059,000 market share for young women 12-19 y (MRI Teenmark, 1993).

Media Influence

Hickman et al. (1993) noted a higher proportion of health messages in women's magazine in 1990 than 1975. Whether this increase affects or simply reflects women's concerns was not evaluated but a trend toward increased nutritional claims in advertising was observed. Print media has been found to be a major source from which consumers seek nutritional information (Pratt and Pratt, 1995). Therefore, print media are ideal for delivering educational messages to young women without an authoritarian connotation. However, the key to that delivery is brevity and entertainment. Marketers are using low-hype sound-bites (see Glossary) to reach the MTV generation. Media attention to the teen market is purely economic. Collectively, teens spend almost $100 billion a year in clothing, food and entertainment (Faiola, 1995).

Advertisers have used sophisticated psychology and sociology to target young adults. Teen exposure to marketing through media is greater than ever before. In addition to the influence of television (65% have their own televisions), specialty magazines that appeal to more narrowly defined and receptive audience have proliferated. Over the next two decades, modern teenagers are predicted to become the biggest force among American consumers since the now mid-life baby boomers (Faiola, 1995).

Stice et al. (1994) studied the eating and media habits of 238 Arizona State University coeds (mean age = 20 y) and found those who spent a lot of time reading popular women's magazines and watching television were significantly more likely to display symptoms of eating disorders (binging and purging) and to be dissatisfied with their physical appearance than those who did not.

Although cross-sectional research cannot identify causality, the Stice study provides support for the hypothesis that repeated media exposure to a thin role-model leads women to internalize that stereotype. Identity issues have also been shown to be strongly influenced by weight in adolescent girls. As the obesity index increased, self-esteem decreased in a sample of 550 14- and 16-year-old female volunteers who were administered the Rosenberg self-esteem scale (Martin et al., 1988).

Wiseman et al. (1992) researched cultural views of the ideal female body by tracking Playboy magazine centerfold and Miss America contestant weights during the period 1979-1988. Over the 10-year period, 69% of the Playboy centerfolds and 60% of the Miss America contestants had weights >15% below the expected weight for height and age as determined by the Society of Actuaries table. Wiseman's study supported earlier research which also found a thinner "ideal" weight in both contestants and centerfolds during the time period 1959-1978.

The number of weight loss and exercise articles was determined over a 30 year period (1959-1988) for 6 women's magazines (Harper's Bazaar, Vogue, Ladies Home Journal, Good Housekeeping, Woman's Day, McCall's). A dramatic increase in the number of diet, exercise and diet/exercise articles was discovered. The level of diet articles dropped off in 1981 only to be surpassed by articles dealing with exercise. The Wiseman study noted the following: (1) the observed body weight was 15% below expected weight which was the same criteria used by the DSM-III-R for diagnosis of anorexia nervosa and (2) excessive exercise is an alternative method of purging following a binging episode for weight control (Wiseman et al. 1992).

Our society's fascination with sports risks greater numbers of females for disordered eating who may view over-training as harmless and even necessary to stay competitive and healthy. Our cultural view of beauty has evolved to become one that is often medically incompatible with health, resulting in lifelong consequences (Nattiv, 1994).

METHODS

Magazine Selection

A request for readership (audience) demographics was sent to women's magazines selected from a listing of the top 100 best-selling U.S. magazines. Eighteen magazines from the top 100 met the criteria: (1) a monthly paid circulation of at least one million {Audit Bureau of Circulations (ABC), 1994} and (2) local library availability for the selected years. However, many of the 18, which included general-interest magazines such as Modern Maturity, Life and Reader's Digest appealing to both men and women, were excluded. Selected magazines included the following: Good Housekeeping, Ladies Home Journal, Better Homes and Gardens, Redbook, Glamour, Seventeen, Mademoiselle, Family Circle, Vogue, Cosmopolitan, McCall's and Woman's Day.

Four magazines were then chosen for this study based on the following criteria: (1) a median age audience that included the target group for bone accretion and (2) the largest percentage audience share of female readers within the target age categories. The magazines selected based on Mediamark Research (MRI, 1994) were these:

- Seventeen: 44.8% of ages 12-19 y at 6,059,000,
- Mademoiselle: 58% of ages 18-29 y at 3,187,000,
- Ladies Home Journal: 45% of ages 30-49 y at 7,241,000 and
- Good Housekeeping: 37% of age 50 y+ at 9,231,000.

The four magazines were selected from the 100 best selling magazines. Demographic data were obtained on the four magazines selected. The median age of female readers was

18.2 y, 27.3 y, 47 y, and 42.8 y, respectively (MRI, 1994). Audience share is defined as the number of readers-per-copy (circulation x 5.6 = audience share) and includes issues distributed to public facilities such as schools and libraries. Circulation was determined by primary readers who subscribe (MRI Doublebase, 1993).

Audience share, when expressed as a percentage (%), is used by magazines to profile readership and chart trends. At the time of the study, Good Housekeeping was read by more women ages 18-29 y (7,588,000) than Mademoiselle (3,187,000) but Good Housekeeping's audience share of the target age group was only 30% of its total audience. Fifty-eight percent of Mademoiselle's audience was 18-29 years old (MRI, 1994). The percentage may also influence editorial slant and choices in advertising. These data were used as part of the final selection criteria for the study.

Sampling Procedure

Magazines were sampled quarterly beginning in 1986 (four years prior to the release of 1989 RDA's) and then continuing from 1991 through 1994 (four years after release of the 1989 RDA's). Four issues per year of each magazine were selected for analysis. Every third issue (March, June, September and December issues) was used to reduce the possible confounding effect of seasonal advertising (Table 3).

A data unit was defined as a magazine issue sampled. A 128 issue collection was chosen from alternative proposals of 72, 96 and 182 magazines. The 128 issue size was large enough to increase statistical sensitivity and enable generality by allowing for several years of quarterly sampling. Therefore the sample consisted of a total of 128 data units (4 quarterly issues from 4 magazines x 8 years) for calcium and weight loss analyses. Data

collected included measurements in the following categories: calcium ads, calcium articles, calcium columns, weight loss ads, weight loss articles and weight loss columns. The attention span for processing nutritional information varies as to the format by which it is presented. Adults are more likely to remember information delivered through succinct ads than lengthy text. The large volume of nutritional material available in popular magazines has been thought to result in less recall and consumer "information overload" (Pratt and Pratt, 1995).

The four magazines selected were sampled in accordance with the schedule shown in Table 3.

Table 3. Magazine Sampling Schedule.

	1986	1987	1988	1989	1990	1991	1992	1993	1994
Jan									
Feb									
Mar	◆	◆	◆	◆		◆	◆	◆	◆
Apr									
May									
Jun	◆	◆	◆	◆		◆	◆	◆	◆
Jul									
Aug									
Sep	◆	◆	◆	◆		◆	◆	◆	◆
Oct									
Nov									
Dec	◆	◆	◆	◆		◆	◆	◆	◆

Pilot Study (Conducted March, 1995)

A pilot study was conducted to verify that the data exist and could be measured as defined (see Research Method in the next section). Two issues per magazine were randomly chosen (one pre-and one post-1990), for a total of 8 units or 2 issues X 4 magazines.

Eight magazines were obtained and surveyed from the Library of Congress stacks: two issues each of Seventeen and Mademoiselle representing teen-focused magazines targeted to a younger female readership and two issues each of Good Housekeeping and Ladies Home Journal representing women's magazines with female readers' median age of 42.8 and 47 y respectively. One of each pair of magazines was published prior to 1989 (1986-1989) and one post-1989 RDAs (1991-1994). Each magazine was scanned cover-to-cover for every advertisement and article dealing with weight loss and calcium. Each occurrence was described in notes which were later transferred to a data collection form along with the size of the article and whether it was text only, text with black and white photo/drawing, text with color photo of food/product, or text with color photo of model. Data were consolidated in an Excel spreadsheet and were used to develop revised selection criteria.

Based on this pilot sample of eight issues, data appeared to support the hypotheses. As shown in the table below, calcium advertising was more prevalent in women's magazines and weight loss advertising and articles predominated teen-focused magazines.

Table 4. Pilot Results of Content As Related to Magazine Type.

	Magazine Type		
Content	**Teen-focused**	**Women's**	**TOTAL**
Calcium	**0.0**	**6.0**	6.0
Weight Loss	**9.4**	**6.3**	15.6
Both	0.5	1.5	2.0
TOTAL	**9.9**	**13.8**	**23.6**

Units expressed in "full page equivalents": one "full page equivalent" was measured in square inches specific to each magazine.

Research Method

A five-step research method was employed. Specifically, (1) representative magazines were located and surveyed, (2) articles and advertisements focusing on calcium and/or weight loss were identified, (3) each article was tested to ensure keyword(s) {see Selection Criteria} were present, (4) the size and characteristics of the articles/ads containing the desired focus and keywords were recorded and (5) data were analyzed. Details for conducting the above research method are outlined below.

- The Library of Congress, which is the only library in the Washington, D.C. area to house a complete collection of desired magazines, maintains its periodicals in reference but offers lending library privileges for Congressional and Executive branch members. Because the pilot study revealed that the Library did not have 100% of the magazine issues available as hard copy, sufficient data collection time was budgeted to ensure accuracy in the event paper copies could not be located and microfilm had to be substituted. Those issues sampled in the pilot that were included in the 128 magazine schedule were re-assessed by revised criteria.

Microfilm copies of all issues were available at local public libraries for analysis if needed.

Total time spent at the library for the pilot study was over five hours to scan and record data for the eight magazine pilot. Issues were not housed in the library stacks but available on request. That total time per magazine decreased with practice and a revised collection form. This enabled data analysis of the 128 issue collection to be completed within five weeks. Scanning magazines front-to-back and then back-to-front resulted in discovery of two additional ads during the pilot. This added a total of about 15 minutes per magazine and served as a cross-check.

Selection Criteria

- Ads and articles focusing on calcium and/or weight loss included the following subcategories: food, medicines (vitamin/mineral supplements, diuretics, antacids, diet pills and weight loss drinks), exercise (to include equipment and programs such as weight loss camps or mail-away literature for diets promising weight loss). Step #2

- Ads and articles whose focus was unclear were qualified by whether key words specifically or in combination are prominent or frequent. Step #3

- Calcium related ads and articles must contain key words: calcium, bone, minerals or osteoporosis. A bone-building focus had to be stated prominently in the ad or in the article's title. Ads and articles which were questionable were considered based on inclusion of key words. Step #3

- Weight loss related ads and articles must contain key words: burn calories, diet, weight loss, trim, tone or weight control. A weight loss focus had to be stated prominently in the ad or in the article's title. Ads and articles which were questionable were considered based on inclusion of key words. Step #3

Exclusions

- Ads using words such as "calcium" in an irrelevant function were excluded (e.g., Revlon "calcium-fortified nail polish"). Photos of known calcium foods such as Kraft's cheese and National Dairy Board promotions that have previously been associated with key words were excluded if the current ad did not state key words.

- Sports/fitness text that did not contain key words in title or focus (e.g., ad for Reebok's cross-training shoes or an article on gardening promoting exercise as relaxation) were excluded.

- Ads or articles using the word "diet" in a brand name or unrelated marketing context (e.g., Diet Pepsi "promoting" youth and energy) and articles on low-fat diets to lower cancer and coronary heart disease risk were also excluded.

Data Coding

- The code sheet used for the pilot was re-designed to include more detailed categories as column headings on the collection form. These headings were assigned based on notes taken during the pilot study. Because data are nominal with no values assigned, "occurrences" (see Glossary) was either be checked yes (1) or left

blank (0). This eliminated the subjective assignment of a weight or ranking. See Appendix A.

- The page size for each magazine was measured: the page number and total number of pages was included for use in adjusting results for magazines of varying lengths.

- All advertising was included, even ads of less than one quarter page (e.g.: 2 1/2 " x 3"). The intention prior to the pilot was to follow Hickman's model of an advertisement sized one-quarter page or larger (Hickman et al, 1993). However, there were often several pages of smaller black and white ads in a magazine's last section. Measurements were taken (in inches) to determine area of coverage.

Analyses

- For statistical analysis purposes, subject "n" was defined as an occurrence which was noted on a data collection form. See Appendix A. Thus, each particular calcium and weight loss occurrence (be it ad, column or article) counted as one. This increased "n" to a value of 611 and boosted the study's power.

- Statistics used to analyze categorical variables were chi-square and analysis of variance (ANOVA). Teen-focused and women's magazines were examples of independent variables (factors) and calcium and weight loss counts were examples of dependent variables (response variables). NCSS 6.0 (Hintze, 1995) and Excel spreadsheet software were used to analyze the findings.

Glossary

The nature of this study is such that selected words and phrases were used in a very specific application. A glossary of these terms follows:

Analysis of Variance (ANOVA): A statistical technique for testing for differences in means of several groups.

Article: A complete piece of writing, such as a report or essay, that is part of a newspaper or magazine.

Categorical Variables: Qualitative data; the result of a frequency or number of observations in each category.

Column: An abbreviated article designed to deliver information with a minimum of text, often covering several unrelated issues. Size varies from 1/4 to 1/2 page, placed horizontally or vertically on the page.

Data Unit: A magazine issue sampled, e.g., there are 128 data units in this study.

Degrees of Freedom (DF): A measure of variability used in ANOVA analysis, e.g., n (128) - 1 = 127 degrees of freedom for magazines sampled or n (8) - 1 = 7 degrees of freedom for magazine year.

Dependent Variables: The variables being measured; not under the experimenter's control; e.g. the score or number of "occurrences".

Full-Page Equivalent: Size measured in square inches specific to each magazine.

Independent Variable: The variable controlled by the experimenter; e.g., factors (month, type and year) in ANOVA analysis.

Interaction: A situation in a factorial design in which the effects of one independent variable depend upon the level of another independent variable, e.g., AB, AC, BC, or ABC in ANOVA analyses.

Key Words: Words that accompany an advertisement or article that clarify it's identity.

Calcium: Calcium, bone, minerals or osteoporosis.
Weight loss: Weight loss, burn calories, diet, trim, tone or weight control.

Main Effect: The effect of one independent variable averaged across the levels of the other independent variables, e.g., A, B or C in ANOVA analyses.

Occurrence: Term to describe one advertisement, article or column.

Sound-bite: A short catchy phrase, seldom a complete sentence, intended to stick in the mind of the listener or reader.

Teen-Focused Magazines: Magazines primarily marketed to young women with an average median age of 23y, e.g., Seventeen and Mademoiselle.

Women's Magazines: Magazines primarily marketed to women with an average median age of 45y, e.g., Good Housekeeping and Ladies Home Journal.

References:

1. *Fundamental Statistics for The Behavioral Sciences, Second Edition, PWS Publishing Co., 1989.*
2. *NCSS 6.0 Statistical System for Windows, Number Cruncher Statistical Systems, 1995.*

RESULTS

Raw Data Collected

Research conducted primarily at the Library of Congress, Washington, D.C., yielded a total of 611 occurrences of calcium and weight loss material from the four magazine - 128 issue collection (March, June, September and December issues of Mademoiselle, Seventeen, Good Housekeeping and Ladies Home Journal for 1986-1989 and 1991-1994). Raw data were entered on data sheets (Appendix A) and then transferred into an Microsoft Excel spreadsheet where each row represented an occurrence. The information captured for each occurrence is shown in Table 5.

Table 5. Extract of Occurrence Database (First 5 of 611 Rows).

Mag	Mag Yr	Mag Mo	Page #	Subj	Wt Loss	Ca	Ad. Art, Col.	Text	B/W Photo	Color Photo Product	Color Photo Model	Height (in.)	Width (in.)	Area (computed)	Ref Pg. #	Type	RDA: Timing
G	86	3	17	Wt	1		col.	1				10.75	4	43.00	*14*	Women's	Before
G	86	3	17	Ca		1	col.	1				10.75	4	43.00	*14*	Women's	Before
G	86	3	22	Ca		1	ad	1		1		10.75	16	172.00	*14*	Women's	Before
G	86	3	29	Ca		1	ad	1		1	1	10.75	8	86.00	*14*	Women's	Before
G	86	3	47	Ca		1	ad	1		1		10.75	4	43.00	*14*	Women's	Before

The data were then "rolled-up" into another Excel spreadsheet where each row represented a magazine issue - a total of 128 rows as shown in Table 6. Both spreadsheets were imported into NCSS 6.0 (Hintze, 1995) for statistical analysis.

Table 6. Extract of Magazine Database (First 5 of 128 Rows).

Mag	Mag Yr	Mag Mo	Wt Loss Count	Wt Ad Count	Wt Art Count	Wt Col Count	Ca Count	Ca Ad Count	Ca Art Count	Ca Col Count	Wt Loss Area	Wt Ad Area	Wt Art Area	Wt Col Area	Ca Area	Ca Ad Area	Ca Art Area	Ca Col Area	Mag Type	RDA Timing
G	86	3	5	4	0	1	6	5	0	1	225	96	86	43	483.8	440.8	0	43	Women's	Before
G	86	6	5	3	0	2	5	4	1	0	108.6	49	0	59.63	507.9	370.9	137.1	0	Women's	Before
G	86	9	2	0	2	0	3	3	0	0	516	0	516	0	258	258	0	0	Women's	Before
G	86	12	1	0	1	0	0	0	0	0	20	0	20	0	0	0	0	0	Women's	Before
G	87	3	4	2	1	1	1	1	0	0	113	15	86	12	44	44	0	0	Women's	Before

It was not necessary to use microfilm to complete the review of 128 issue collection. All issues were original magazines. The use of primary data from original documents was preferred over microfilm and was considered "the sine qua non of historical scholarship" (Leedy, 1989). Color contrast and maintaining an ad's natural placement within the issue helped ensure that no occurrences were missed. Related ads and articles are often placed in close proximity. The ability to precisely measure ad, column and page sizes which strengthens data reliability would have been degraded if microfilm had been used.

Four Mademoiselle issues were not available in original issue and were substituted with an adjacent month: May replaced June, 1986; August replaced September, 1986; April replaced March, 1993 and July replaced June, 1994. These were re-coded using the intended rather than actual month to maintain the correct quarterly issue and degrees of freedom (3) for magazine month for ANOVA analyses.

Total Calcium and Weight Loss Occurrences

There were 611 total occurrences (ads, articles, columns) of calcium and weight loss material in all four magazines. The vast majority of these (83%) dealt with weight loss. There were 192 weight loss occurrences (38%) in women's magazines (Good Housekeeping and Ladies Home Journal) versus 313 occurrences (62%) in teen-focused magazines (Mademoiselle and Seventeen). Of the 106 calcium occurrences, 95 or 90% were in women's magazines. In contrast, 11 occurrences or 10% were in teen-focused magazines.

Chi-square (χ^2) is a statistical test used to analyze categorical data. These data can be shown as a 2 X 2 contingency table (Table 7). Each observation is simultaneously classified on the basis of two variables: content (calcium or weight loss) and magazine type (teen-focused or women's). Chi-square (χ^2) analysis indicated that there was a relationship between magazine types and calcium versus weight loss coverage ($\chi^2 = 93.66$, $p < .001$ in Appendix C). Clearly calcium occurrences predominated in women's magazines and weight loss occurrences were almost twice as likely to be found in teen-focused magazines.

Table 7. Contingency Table of Calcium and Weight Loss Occurrences by Magazine Type.

	Magazine Type		
	Teen-Focused	**Women's**	
Calcium	**11** 10%	**95** 90%	**106** 17%
Weight Loss	**313** 62%	**192** 38%	**505** 83%
			611

Expanding the profile over time, Table 8 provides calcium and weight loss occurrences for the four years prior to (1986-1989) and after (1991-1994) the 1989 RDAs. The differences between magazine types are shown in Figure 1. Seasonal differences are shown in Figure 2.

Table 8. Total Calcium and Weight Loss Occurrences in Teen-Focused and Women's Magazines by Year (1986-89 and 1991-94).

Content	Magazine Type	86	87	88	89	91	92	93	94	Total
Calcium	Teen-Focused	3	2	0	1	0	2	2	1	11
	Women's	21	4	11	12	8	11	9	19	95
Subtotal Calcium										**106**
Weight Loss	Teen-Focused	49	39	36	50	41	31	31	36	313
	Women's	27	21	29	25	20	27	17	26	192
Subtotal Weight Loss										**505**
Total										**611**

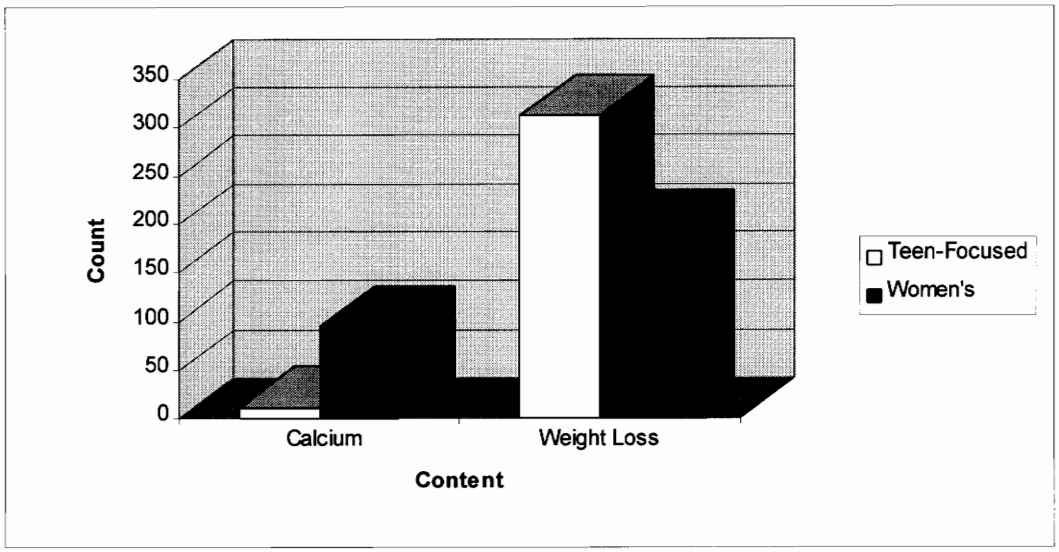

Figure 1. Frequency of Calcium and Weight Loss Occurrences in Teen-Focused and Women's Magazines .

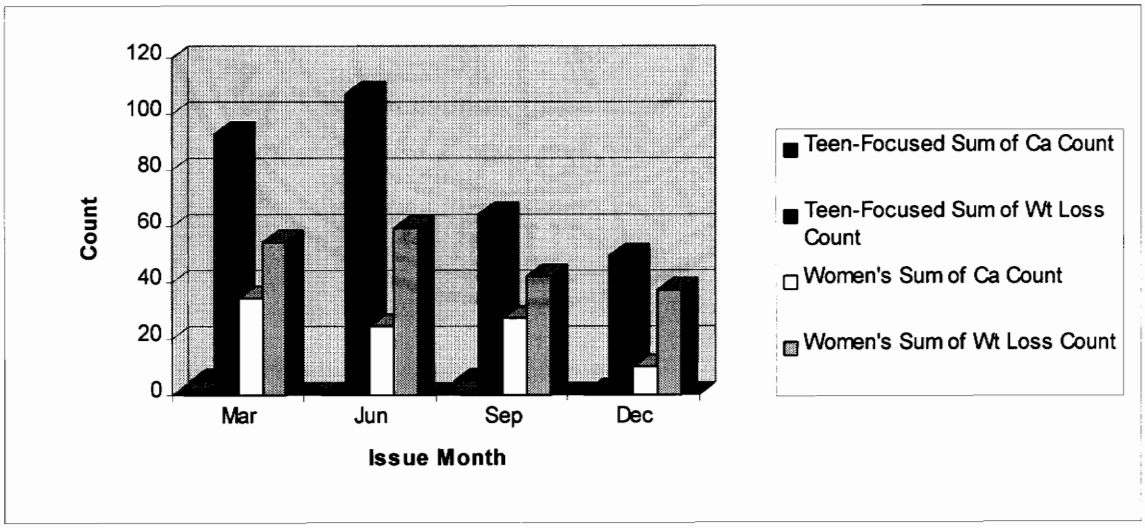

Figure 2. Calcium and Weight Loss Occurrences in Teen-Focused and Women's Magazines by Month.

Total Calcium and Weight Loss Area

Total measured area of ads, articles and columns in both types of magazines was 51,118 sq. in. as shown in Tables 9 and 10. The vast majority of this area - 79% - was found to be weight loss. Of the total weight loss area observed in both magazine types, 59% was found in teen-focused magazines and 41% in women's magazines. In contrast, 5% of the total calcium area including ads, articles and columns was found in teen-focused magazines while 95% was found in women's magazines.

Within each magazine type, calcium coverage comprised 38% of the total calcium and weight loss area in women's magazines while calcium coverage comprised only 2% of the combined calcium and weight loss text found in teen-focused magazines .

Within each magazine type, weight loss coverage comprised 62% of the total calcium and weight loss area in women's magazines while weight loss coverage comprised 98% of the combined calcium and weight loss text found in teen-focused magazines. Calcium and weight loss area coverage by magazine types is shown in Figure 3.

Table 9. Cross Tabulation of Calcium and Weight Loss Area Frequencies in Teen-Focused and Women's Magazines.

Area Count Section

	Subject		
Type	**Ca**	**Wt**	**Area Total**
Teen-Focused	533.45	23610.79	24144.24
Women's	10302.2	16671.84	26974.05
Total	10835.66	40282.63	51118.29

Row Percentages Section

	Subject		
Type	**Ca**	**Wt**	**Total**
Teen-Focused	2.2	97.8	100.0
Women's	38.2	61.8	100.0
Total	21.2	78.8	100.0

Column Percentages Section

	Subject		
Type	**Ca**	**Wt**	**Total**
Teen-Focused	4.9	58.6	47.2
Women's	95.1	41.4	52.8
Total	100.0	100.0	100.0

Table (Total) Percentages Section

	Subject		
Type	**Ca**	**Wt**	**Total**
Teen-Focused	1.0	46.2	47.2
Women's	20.2	32.6	52.8
Total	21.2	78.8	100.0

Chi-square analysis used in the above cross tabulations indicated a relationship between magazine type and area ($\chi^2 = 9875.78$, $p < .001$ as shown in Appendix C).

Table 10. Calcium and Weight Loss Area in Teen-Focused and Women's Magazines by Year (1986-89 and 1991-94).

Content	Magazine Type	86	87	88	89	91	92	93	94	Total
Calcium	Teen-Focused	292.27	70.69	0.00	87.00	0.00	36.00	30.00	17.50	533.45
	Women's	2007.63	292.06	1194.25	1073.67	600.44	1419.75	1685.22	2029.19	10302.20
Subtotal Calcium										**10835.66**
Weight Loss	Teen-Focused	5272.68	2804.13	2438.28	2805.42	2681.15	2179.88	2740.70	2688.55	23610.79
	Women's	2186.28	2252.88	2467.28	2577.44	1701.66	2336.06	835.00	2315.25	16671.84
Subtotal Weight Loss										**40282.63**
Total										**51118.29**

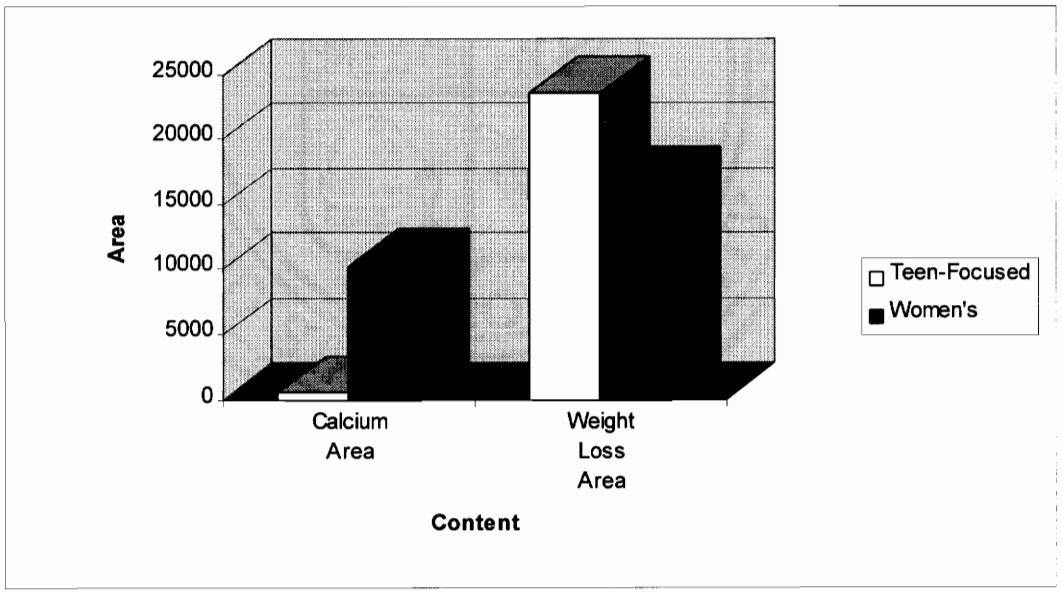

Figure 3. Calcium and Weight Loss Area in Teen-Focused and Women's Magazines.

Comparisons Among Magazine Month, Type and Year

Analysis of Variance (ANOVA) is a statistical technique that tests for differences in the means of several groups. It was the primary statistical tool used in this analysis to determine if there was a difference in calcium or in weight loss occurrences. Three-way ANOVAs were used with four levels of magazine month, two magazine types and eight magazine years. For a few analyses, the factor year was dichotomized to compare pre-RDA (1986-1989) to post-RDA (1991-1994) calcium values. This tool was used to determine significance of counts and area. Factor (month, type and year) significance for calcium and weight loss counts and areas are noted by asterisks in Table 11 (complete ANOVA results available in Appendix C, Tables 1-4).

Table 11. F-Ratio Significance (*) Summary for Calcium and Weight Loss. [1]

Factors	df [2]	Calcium		Weight Loss	
		Count	Area	Count	Area
A (Magazine Month)	3	5.15*	5.33*	8.88*	
B (Magazine Type)	1	63.0*	81.32*	24.12*	
C (Magazine Year)	7	2.57*	3.05*		
AB	3		3.73*		
AC	21				
BC	7		2.46*		
ABC	21				

* $p < .05$.

[1] Month, type, and year comparisons including interactions.

[2] df = Degrees of Freedom.

Average Calcium Occurrences and Areas

Three-way ANOVA tests of total calcium count interactions (AB, AC, BC, ABC) for magazine month (A), magazine type (B) and magazine year (C) produced no significant interactions. F-ratios for main effects were (A): 5.15, (B): 63.00 and (C): 2.57. All three main effects were significant at the .05 level (Table 11). Overall, there were over eight times more calcium occurrences in women's magazines than in teen-focused magazines as shown in Table 8.

Three-way ANOVA tests of total calcium area were significant for AB: ($F = 3.73$, $p < .02$) and BC: ($F = 2.46$, $p < .03$). Interactions of month/type (AB) and type/year (BC) are shown in Figures 4 and 5. The nonparallel lines reveal the effect of month and the effect of year are not the same for magazine type. The nearly stable calcium coverage in teen-focused magazines shows little change by month (March, June, September and December), nor by year (1986-1989, 1990-1994). Data from women's magazines, however reveal fluctuations in both month and year. The December issues had the lowest calcium coverage and March and September, the highest. The years 1986 and 1994 led in calcium coverage while 1987 had the lowest. Overall, there was almost 20 times more area in calcium ads, articles and columns in women's than in teen-focused magazines (Table 10).

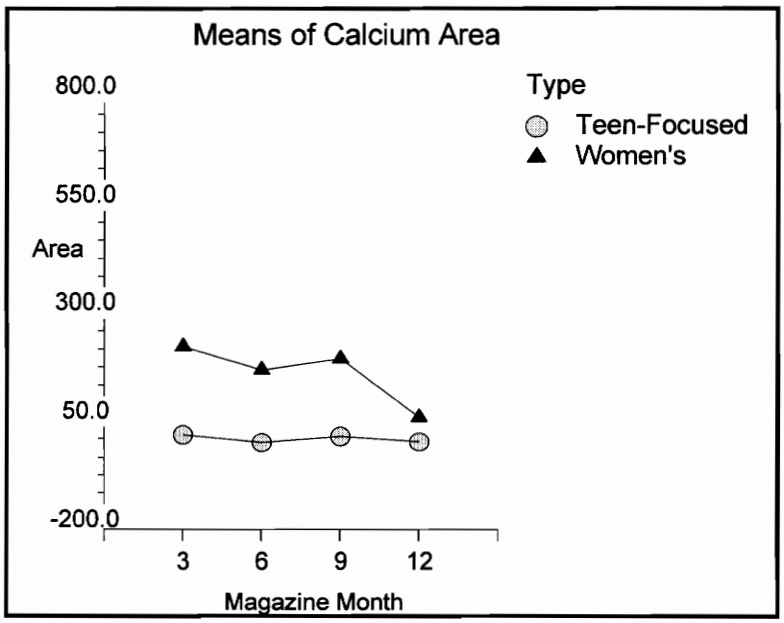

Figure 4. Calcium Area Means By Magazine Month and Type (AB).

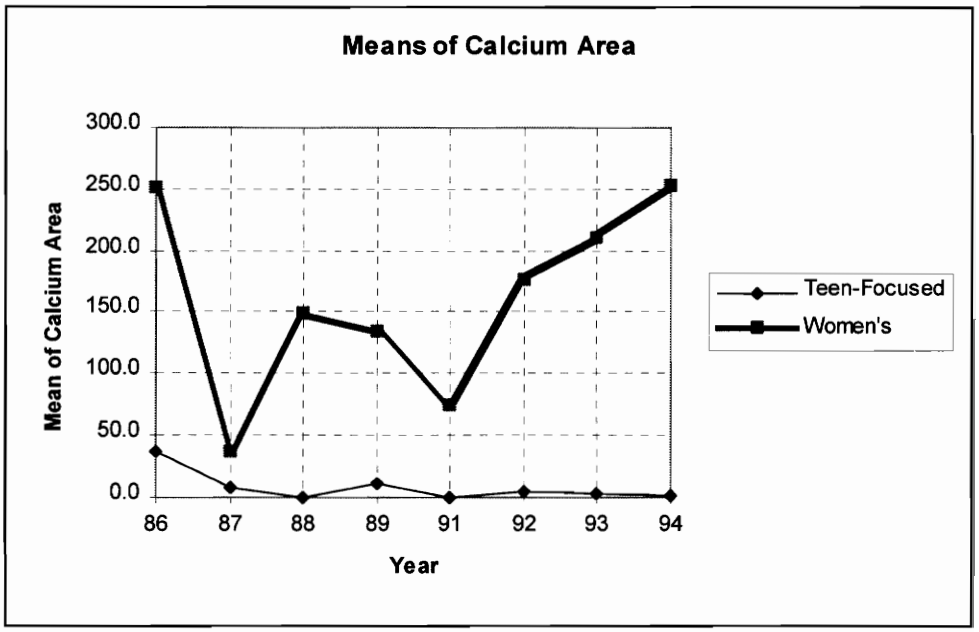

Figure 5. Calcium Area Means By Magazine Type and Year (BC).

Average Weight Loss Occurrences and Areas

Three-way ANOVA tests of total weight loss counts for magazine month (A), magazine type (B) and magazine year (C) produced no significant interactions (Table 11). F- ratios for main effects were (A) 8.88 and (B): 24.12. These two main effects were significant at $p < .0001$. Overall, there were 37 % more occurrences of weight loss material in teen-focused than in women's magazines (Figure 1).

Three-way ANOVA tests of total weight loss area in teen-focused and women's magazines with magazine month (A) magazine type (B) and magazine year (C) did not attain significance for any of these tests.

Impact of 1989 Recommended Dietary Allowances

As shown in Table 12, two-way ANOVA tests of calcium counts with magazine type (A) and RDA timing (B) failed to find significance for RDA timing at the .05 level. Additionally, a two-way ANOVA of calcium area with magazine type (A) and RDA timing (B) also failed to find significance for RDA timing at the .05 level.

The increased recommendation for calcium in the 1989 RDAs did not change calcium coverage for either magazine type. The lack of significance for RDA timing is displayed in Figure 6, as well as the significant differences in calcium coverage between the two magazine types. Of the 106 total calcium occurrences in ads, articles and columns, six were pre-1989 RDA (1986-1989) and five post-1989 RDA (1991-1994) for teen-focused magazines (Mademoiselle and Seventeen) while 48 were pre-RDA and 47 were post-RDA for women's magazines (Good Housekeeping and Ladies Home Journal) as shown in Table 13 and in Figure 6.

Table 12. F-Ratio Significance (*) Summary For Calcium.

Factor	df [1]	Calcium	
		Count	Area
A (Magazine Type)	1	53.80*	56.03*
B (RDA Timing)	1		
AB	1		

* $p < .05$.
[1] df = Degrees of Freedom

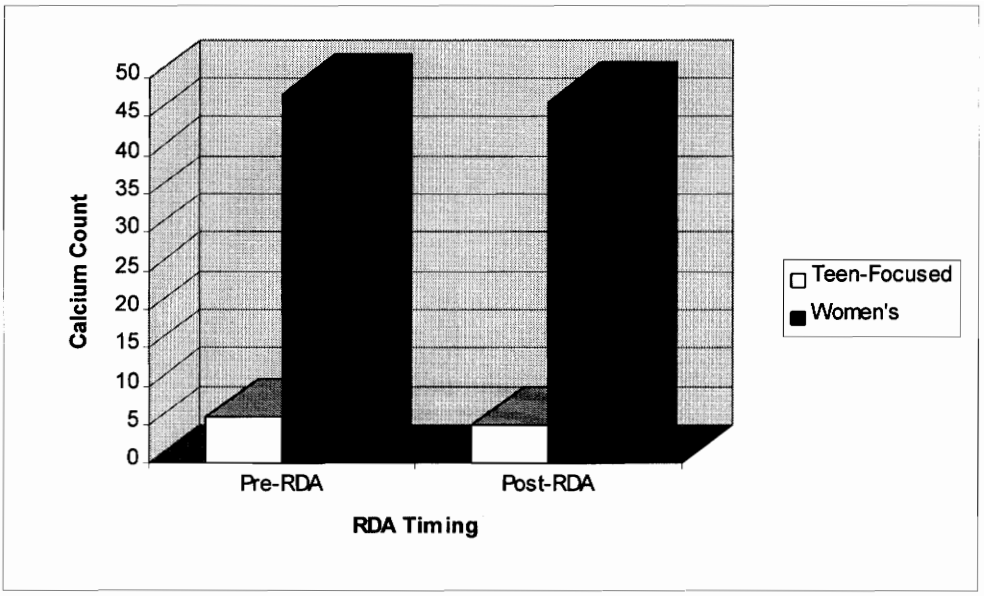

Figure 6. Calcium Count in Teen-Focused and Women's Magazines Pre- and Post-RDA Change (1989).

Table 13. Calcium Count in Teen-Focused and Women's Magazines Pre- and Post-RDA Change (1989).

	RDA Timing		
Magazine Type	**Pre-RDA (1989)**	**Post-RDA (1989)**	**Total**
Teen-Focused	6	5	**11**
Women	48	47	**95**
Total	**54**	**52**	**106**

Comparison of Calcium and Weight Loss Occurrences in Ads, Articles and Columns

Up to this point, analysis of variance results for calcium occurrences, calcium area, weight loss occurrences, and weight loss areas have been presented. Each of these response variables is the sum of three measured component parts; namely, ads, articles, and columns. Although each contributes to the overall significance of the composite variable, some of these individual components were significant at the .05 level and others were not, as shown in Table 14. Ad, article and column data are given for calcium and weight loss occurrences and are presented in Table 15 and in Figure 7.

Table 14. F- Ratio Significance (*) Summary For Calcium and Weight Loss Occurrences.

Factor	df[1]	Calcium Count				Weight Loss Count			
		Group[2]	Ad	Art	Col.	Group	Ad	Art	Col.
A (Magazine Month)	3	5.15*	4.32*			8.88*	5.11*		
B (Magazine Type)	1	63.0*	86.91*			24.12*		8.14*	12.13*
C (Magazine Year)	7	2.57*	3.13*						
AB	3		3.87*				2.91*		
AC	21								
BC	7		2.60*						
ABC	21								

* $p < .05$.
[1] df = Degrees of Freedom
[2] Group: refers to the composite of all 3 variables (ads, articles, columns).

Table 15. Occurrences of Calcium Ads, Articles, and Columns and Weight Loss Ads, Articles, and Columns in Teen-Focused and Women's Magazines.

Magazine Type	Wt Ad Count	Wt Art Count	Wt Col. Count	Ca Ad Count	Ca Art Count	Ca Col. Count
Teen-Focused	148	101	64	2	6	3
Women's	108	55	29	80	9	6
Total	256	156	93	82	15	9

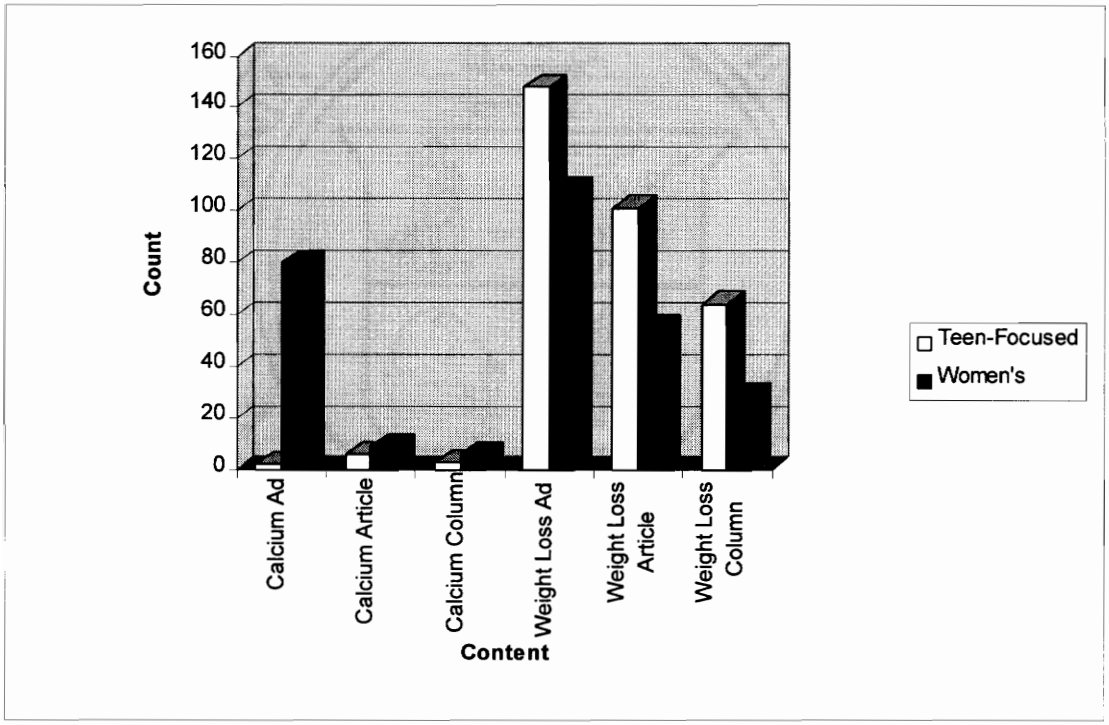

Figure 7. Occurrences of Calcium Ads, Articles, and Columns and Weight Loss Ads, Articles, and Columns in Teen-Focused and Women's Magazines.

Average Occurrences of Calcium Ads, Articles, Columns

A three-way ANOVA test of calcium counts for ads was significant for AB: ($F = 3.87$, $p < .01$) and BC: ($F = 2.60$, $p < .02$). Three-way ANOVA tests of calcium counts of articles and columns with magazine month (A), magazine type (B) and magazine year (C) failed to find significance for any combination of factors at the .05 level.

Interaction effects of (AB) and (BC) are shown in Figures 8 and 9. Teen-focused ad counts were approximately the same irrespective of year (1986-1989 and 1991-1994) and month (March, June, September and December). A yearly difference can be observed in women's magazines, however, with 1986 and 1994 the leaders in calcium advertising. Fluctuations in season reveal the December issue with the lowest occurrences and March and September, the highest.

The primary source of calcium information in women's magazine was advertising. There were over five times the number of ads (80) as articles (9) and columns (6) combined. On a much smaller scale, this situation was reversed in teen-focused magazines. Articles (6) presented more calcium information than ads (2) and columns (3) combined as shown in Table 15.

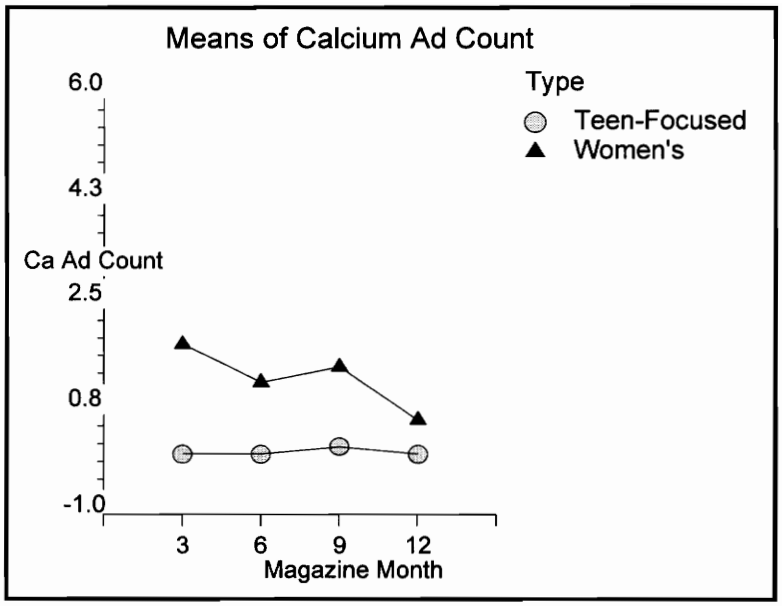

Figure 8. Calcium Ad Count Means By Magazine Month and Type (AB).

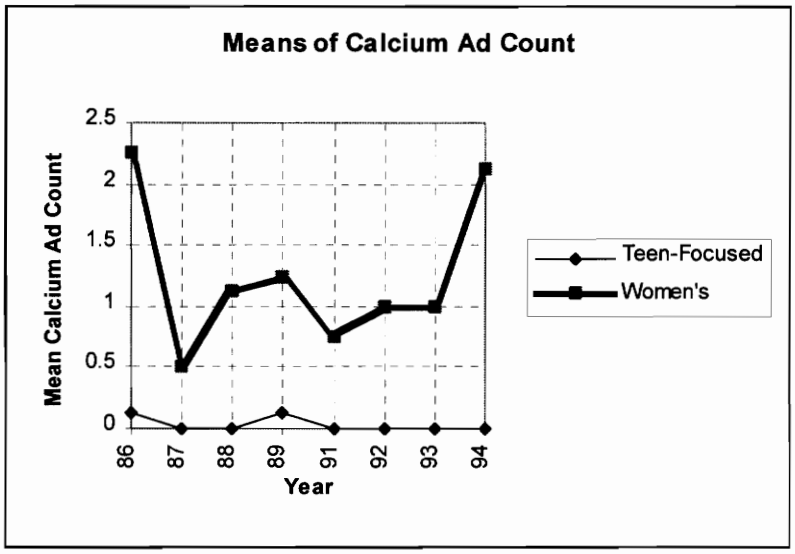

Figure 9. Calcium Ad Count Means By Magazine Type and Year (BC).

Average Occurrences of Weight Loss Ads, Articles, Columns

Two three-way ANOVA analyses of weight loss occurrences of ads, articles and columns with magazine month (A), magazine type (B) and magazine year (C) were only significant for articles: ($F = 8.14$, $p < .006$) and columns: ($F = 12.13$, $p < .001$) for magazine type as shown in Table 14. There were no significant interactions at the .05 level.

The three-way ANOVA test of weight loss occurrences for ads, however, was significant for month/type (AB): ($F = 2.91$, $p < .04$). Interaction effect of (AB) is shown in Figure 10. The nonparallel lines reveal the effect of month is not the same for magazine type. Weight loss advertising in women's magazines remained steady throughout the year and is not affected by the quarterly issue (March, June, September and December). However; weight loss content in teen-focused magazines observed a seasonal pattern. December had the lowest proportion of weight loss advertising and June, the highest.

The primary source of weight loss information in women's magazines were ads (108) over articles (55) and columns (27). Advertising (148) was also favored in teen-focused magazines over articles (101) and columns (64) as shown in Table 15.

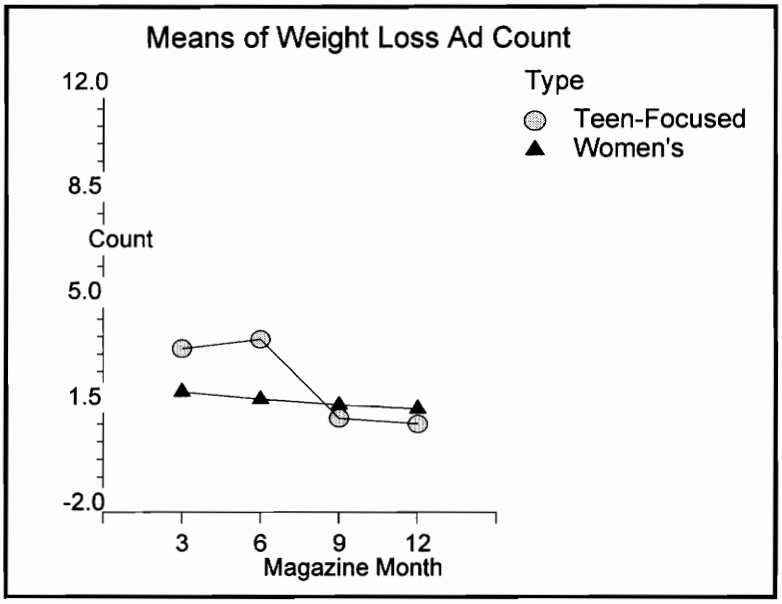

Figure 10. Weight Loss Ad Count Means by Magazine Month and Type (AB).

Comparisons of Calcium and Weight Loss Areas in Ads, Articles, Columns

Tables 16 and 17 and Figure 11 address the contribution of component parts (ads, articles and columns) to calcium and weight loss area. Although each contributes to the overall significance of the composite variable, some of these individual components were significant at the .05 level and others were not as shown in Table 16. Complete ANOVA tables are available in Appendix D.

Table 16. F-Ratio Significance (*) Summary For Calcium and Weight Loss Area.

Factor		Calcium Area				Weight Loss Area			
	df	Group	Ad	Art	Col.	Group	Ad	Art	Col.
A (Magazine Month)	3	5.33*	7.09*						
B (Magazine Type)	1	81.32*	124.5*					5.87*	6.68*
C (Magazine Year)	7	3.05*	4.93*						
AB	3	3.75*	6.17*						
AC	21								
BC	7	2.46*	4.67*						
ABC	21								

*$p < .05$.

Table 17. Areas of Calcium Ads, Articles, and Columns and Weight Loss Ads, Articles, and Columns in Teen-Focused and Women's Magazines.

Magazine Type	Wt Ad Area	Wt Art Area	Wt Col. Area	Ca Ad Area	Ca Art Area	Ca Col. Area
Teen-Focused Total	3639.8	17266	2705	175.4	285.4	72.7
Women's Total	5760.1	9760.9	1150.9	9065.6	1099.9	137.8
Total	9399.8	27027	3855.9	9240	1385.3	210.4

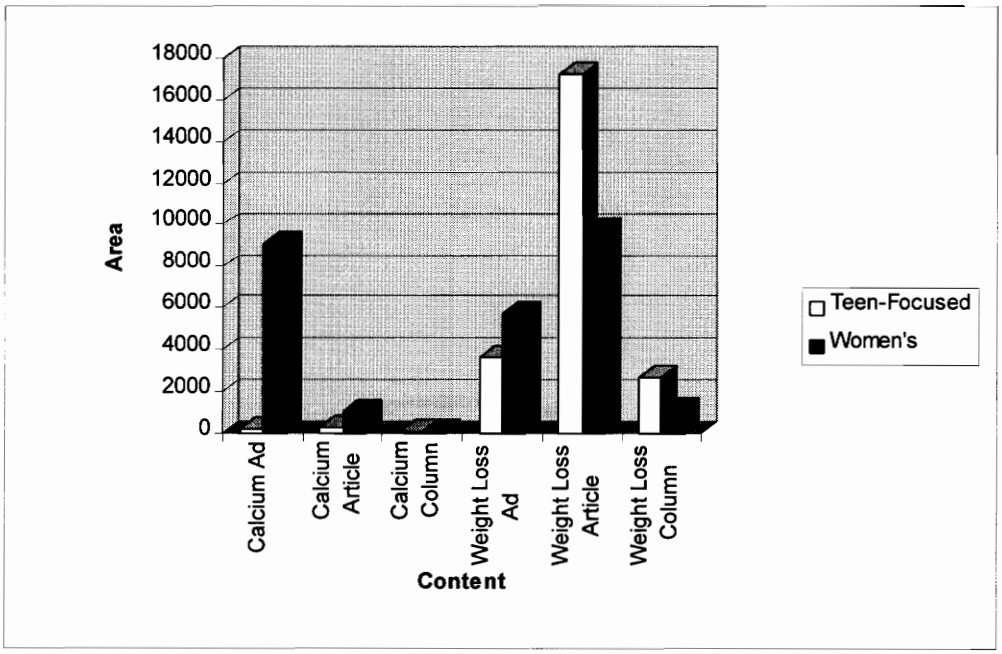

Figure 11. Areas of Calcium Ads, Articles, and Columns and Weight Loss Ads, Articles, and Columns in Teen-Focused and Women's Magazines.

Average Area of Calcium Ads, Articles, Columns

Three-way ANOVA tests of calcium area of articles and columns with magazine month (A), magazine type (B) and magazine year (C) failed to find significance for any of the factors. A three-way ANOVA test of calcium area for ads was significant for month/type AB: ($F = 6.17$, $p < .0002$) and type/year BC: ($F = 4.67$, $p < .0003$).

Interaction effects of month/type (AB) and type/year (BC) are shown in Figures 12 and 13. Calcium ad area means in teen-focused magazines did not change by quarterly issue (March, June, September and December), and remained fixed regardless of study year. Ad area in women's magazines, however, showed a difference by year and month. 1986 and 1994 led while 1987 and 1991 had the least ad area. The December holiday issue had the lowest calcium ad area while March and September had the highest.

The calcium message was overwhelmingly delivered through advertising in women's magazines. Ad space (9,065 sq. in.) was seven times the space given to articles (1,100 sq. in.) and columns (138 sq. in.), and over 50 times the area for calcium ads found in teen-focused magazines (175 sq. in.) as shown in Table 17.

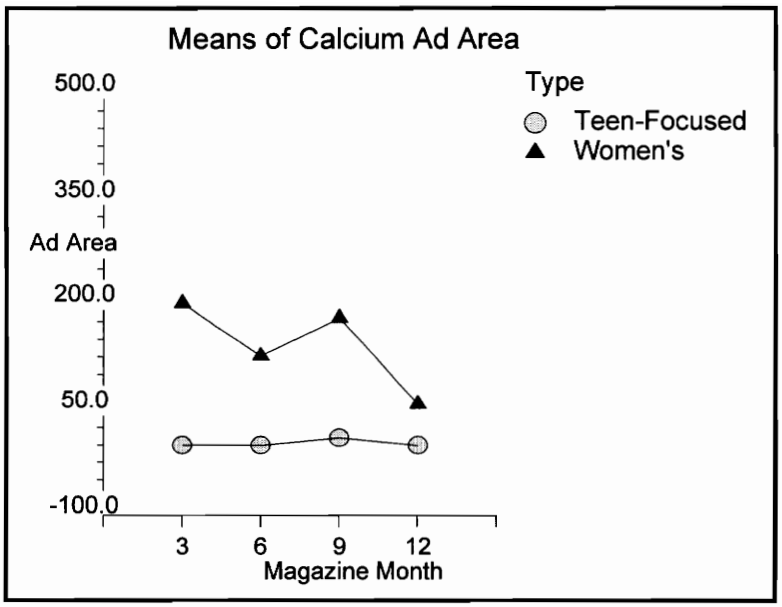

Figure 12. Calcium Ad Area Means By Magazine Month and Type (AB).

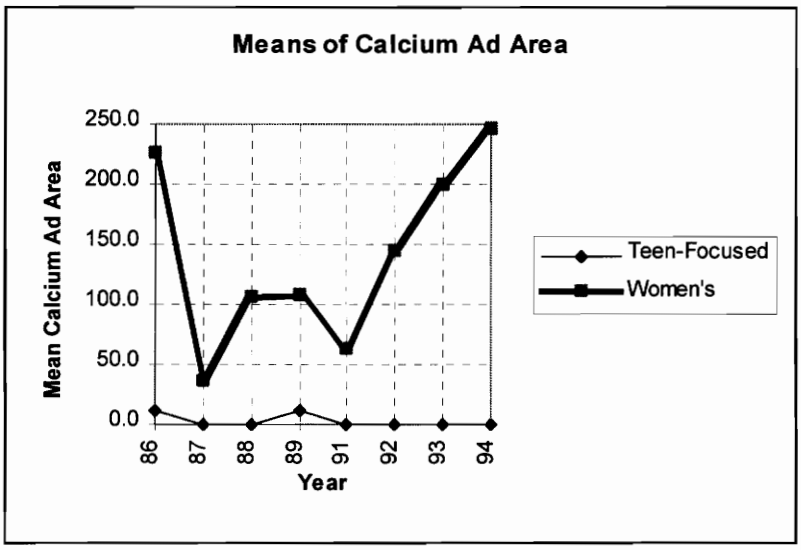

Figure 13. Calcium Ad Area Means By Magazine Type and Year (BC).

Average Area of Weight Loss Ads, Articles, Columns

Three-way ANOVA tests of weight loss area in ads, articles and columns for magazine month (A), magazine type (B) and magazine year (C) were only significant for type (B) in two components: articles ($F = 5.87$, $p < .02$) and columns ($F = 6.68$, $p < .02$). There were no significant interactions at the .05 level.

There was nearly twice as much article area in teen-focused (17,266 sq. in.) vs. women's magazines (9,761 sq. in.) for weight loss, and over twice as much in columns (2,705 vs. 1,151 sq. in) as shown in Table 17.

DISCUSSION

The data support the study's initial hypotheses and confirm the pilot study's indications of disproportionate calcium and weight loss coverage in teen-focused vs. women's magazines (Figures 14 and 15). Furthermore, there was no change observed in calcium coverage in either magazine type relative to the 1989 RDAs (Figure 16). Specifically, there was no change in teen-focused magazines due to the increased recommended calcium allowance for females 19-24 y.

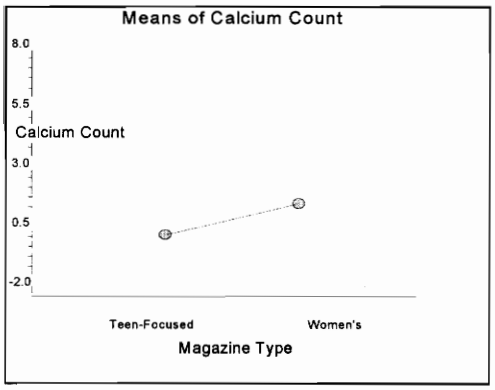

Figure 14. Calcium Count Means by Magazine Type (ANOVA 1).

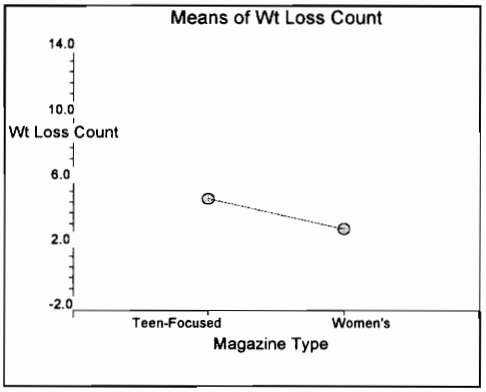

Figure 15. Weight Loss Count Means by Magazine Type (ANOVA 3).

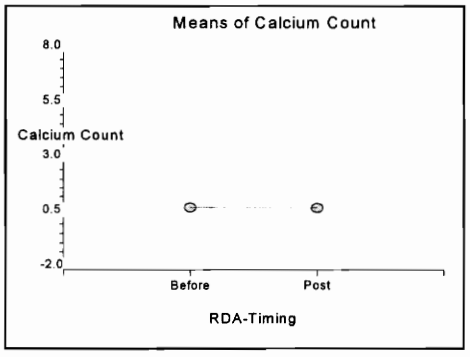

Figure 16. Calcium Count Means by RDA-Timing (ANOVA 5).

The majority of space in regard to these two issues was allocated to weight loss for both magazine types; however, in women's magazines it was somewhat balanced by 38% coverage for calcium. Teen-focused magazines dedicated less than 2.2% of the space observed for bone health products and issues (Table 9).

Chi-square analysis (χ^2) was used to test the statistical validity that observed calcium and weight loss frequencies between magazine types were significantly different and were not due to random sampling error. Chi-square was significant for count: ($\chi^2 = 93.66$, $p < .001$) and for area: ($\chi^2 = 9875.78$, $p < .001$) as shown in Appendix C. Because probability was conventionally set at .05, these results indicate a 95% confidence that the differences between magazine types were real.

Three-way analyses of variance (ANOVA) measured variability by F-ratios. A ratio of approximately 1 (an equal proportion of between-group to within-group variability) would support the null hypothesis that all groups tested came from the same population of magazine types. A large ratio indicates the variance between groups sufficiently exceeds the variance within and the groups were not related. This was the case for differences observed between magazine types for calcium count, calcium area and weight loss count. Given 127 degrees of freedom for within-group variation, a computed F-ratio would have to exceed a cutoff point of 3.92 at .05 level to show significance. F-ratios for magazine type with calcium count, calcium area and weight loss count were significant with F-ratios of 63.00, 81.32 and 24.12, respectively ($p < .05$). Therefore, one can reject the null hypothesis and conclude that the magazines sampled came from populations with different means of calcium count within magazine type. The frequencies

of occurrences for calcium and weight loss content were significantly different in teen-focused and women's magazines. See ANOVA 1-3 in Appendix D.

Alternatively, two-way ANOVAs of calcium count and area were not significantly different for either magazine type for the time period before and after the RDA change. F-ratios of .03 and .37 did not come close to exceeding the critical value of 3.92. The release of increased Recommended Dietary Allowances for calcium in 1989 did not affect calcium coverage for either magazine type. Women's magazines continued to feature calcium and bone issues for the time period without an official RDA change. And calcium coverage in teen-focused issues did not increase even though they were representing the only age group affected, women 19-24 y.

The number of mineral supplement ads in women's magazines did reflect increased attention to calcium which has remained a news item since the 1984 Consensus Conference on Osteoporosis. From the study period of 1986-1989 there were a total of 41 calcium ads in women's magazines and 39 ads from 1990-1994 (Table 18).

Table 18. Calcium Ad Occurrences in Teen-Focused and Women's Magazines by Year (1986-89 and 1991-94).

Magazine Type	86	87	88	89		91	92	93	94		Total
Teen-Focused	1	0	0	1	2	0	0	0	0	0	2
Women's	18	4	9	10	41	6	8	8	17	39	80
Total	**19**	**4**	**9**	**11**	**43**	**6**	**8**	**8**	**17**	**39**	**82**

This steady coverage also reflects a parallel movement toward personal involvement in health and nutrition (Hickman et al. 1993). In spite of continued coverage, the percentage

of persons taking daily supplemental calcium decreased from 6.2% in 1987 to 4.9% in 1992 (Slesinski et al. 1995). The greatest change in calcium intake was among women ages 55-64 y. This decrease was thought due to estrogen replacement therapy (ERT) use in place of calcium (Slesinski et al. 1995). The present study also noted pharmaceutical ads (Ciba: Estraderm and Wyeth Averest: Premarin) beginning in 1992 which promoted ERT as a means to offset bone loss. Because of inclusion of key words (bone, osteoporosis) these ads became occurrences in the bone/calcium data base.

Use of multi-factorial designs such as the three-way ANOVA allowed greater generalizability of data since results are averaged across all effects. All three main effects: (A) month, (B) type and (C) year and two interactions (AB) and (BC) were significant for calcium count in ads (Table 14). Interactions bring to the surface existing interrelationships that were previously unrevealed. These results not only addressed the thesis question of dissimilar coverage by magazine type, but also by month and type (AB: Figure 8) and by type and year (BC: Figure 9).

Women's magazines reflect fluctuations in year (1986-1989 and 1991-1994) and month (March, June, September and December) with the December issue having the lowest occurrences of calcium ads and March and September, the highest. Although data showed significant differences in calcium occurrences between the two types, the very small sample size of calcium ads in teen-focused magazines precluded any seasonal analyses.

Three-way analyses reduces sampling error and enables more complex comparisons to be drawn. Magazine type was significant for total calcium count and area (both representing the sum of ads, articles and columns) but not for the separate components of articles and

columns, per se (Tables 14 and 16). Overall group significance addresses the powerful contribution of ads to total significance. There were 80 ads for calcium and 9,066 sq.in. of calcium coverage in women's magazines compared to the 2 ads for calcium and 175 square inches found in teen-focused magazines for the 8 year study period (Tables 15 and 17).

Whether or not relevant advertising accompanied feature articles or whether the reader is more influenced by an ad vs. an article were not issues addressed in this study. The way by which that information was presented, however, can be useful in developing strategies for change. A widespread advertising campaign could also elevate the status of calcium among younger women. Saturating the teen market now with calcium promotion would take advantage of their current fad of collecting glossy magazine ads. Posters and advertisements have become hot collectibles among youngsters. Ads are often carefully stored within plastic sheaths in notebooks and even Xerox copies of hot ads are considered "valuable". There are a growing number of teens collecting and trading colorful ads such as Absolut vodka that frequent popular magazines (Pogrebin, 1995).

Parents have voiced concern over the subliminal suggestive power of these ads but such power also has a positive potential. Clearly one way to reach teens and youngsters is through clever advertising. Although this study only looked at specific quarterly issues, the pattern of calcium ads in women's magazines may serve as a model. Calcium promotion may be better received if the ad does not compete with holiday coverage (December) and coincides with back to school preparations (September).

Timing and packaging should be an apt challenge for the Madison Avenue minds who disguised advertising as entertainment with the unlikely characters of Joe Camel and Spuds MacKenzie. The dairy industry hoped to generate such appeal with their advertising campaign released in 1995. Full page ads of celebrities sporting milk mustaches have included star athletes Pete Sampras and Kristie Yamaguchi. The cachet and collectability and most important, efficacy of these ads remains to be seen. Even though the majority of teen weight loss information was presented as advertising, ANOVA analysis found articles and columns, but not ads, to be significant by type. Although the actual frequency of weight loss ads was greater; 148 vs. 108 in women's magazines (Table 19), the difference between types was not large enough for a significant F-ratio. Also see Table 14 for Factor Significance Summary and Table 15.

Table 19. Weight Loss Ad Occurrences in Teen-Focused and Women's Magazines by Year (1986-89 and 1991-94).

Magazine Type	86	87	88	89	91	92	93	94	Total
Teen-Focused	19	15	15	23	23	17	18	18	**148**
Women's	17	9	19	11	11	15	11	15	**108**
Total	**36**	**24**	**34**	**34**	**34**	**32**	**29**	**33**	**256**

Nearly 60% of all weight loss information observed during this study was found in teen-focused magazines. Many articles were found to be borderline, given the study's criteria for key words, and were not counted. It is very likely that 60% was a conservative estimate for teen-focused magazines whose focus has always been fashion and body image. Thus, an effort to reduce their weight loss emphasis should primarily target

magazine editors rather than ad sponsors who value the lucrative teen market. A shift in magazine identity from the ubiquitous ultra-thin image toward personal health empowerment may result in a similar mind-set shift in their readers, and in the process, improve the density of their bones.

CONCLUSIONS AND OUTLOOK

The large volume of calcium text and advertising observed in women's magazines indicates the right message has been delivered to the wrong population. Women past their best opportunity to affect bone mass were offered 20 times the calcium coverage as found in teen-focused magazines and 40 times the number of ads. Weight loss, which has been shown to adversely affect bone mass, predominated teen-focused articles and advertising. Teen magazines had 1.4 times the weight loss text as found in women's magazines. A strategy for reversing this picture would be to target teens with "collectible" ads and sound-bite columns. Also, additional studies analyzing all health-related text in teen-focused magazines would shed light on whether health coverage follows any kind of seasonal pattern. The calcium message may be better received and remembered if read in January than July.

In the current era of magazines routinely running sensational and controversial copy, the issue of increasing bone mass becomes a hard sell. Reaching youngsters who have ignored the reality of teen pregnancy and even the AIDS message (Daum, 1996) represents a formidable challenge for nutritionists. The apathy among many generation X'ers over behaviors that could cost them their lives reveals the magnitude of their denial. Long range consequences like postmenopausal bone mass do not become an immediate priority. Thus, the calcium message will need every possible advantage from smart packaging and appropriate timing to a reader-friendly format to win over this audience. Despite these obstacles, however, the effort can be pre-judged worthwhile by the fact the message had been delivered to the right population at their right time.

SUMMARY

The relationship between maladaptive eating habits and reduced bone mass at maturity has been well-documented (Emerson and Stern, 1993, Nattiv, 1994, Recker et al. 1992). This study was designed to evaluate magazine frequency of calcium and weight loss content targeted to two specific groups: one group under the age range of peak bone accretion (<30 years) and the other over the age of 30 (Matkovic, 1991). The content of two young women's magazines with a teen-focus (Mademoiselle and Seventeen) and an average median reader age of 23 years was compared to two women's magazines (Good Housekeeping and Ladies Home Journal) whose readers, past their best opportunity to maximize bone mass, had an average median age of 45 years.

There has been rising consumer demand for health information that appears in print (Pratt and Pratt, 1995). This study sought to examine ads, articles and columns in magazines appealing to the aforementioned age groups and postulated that bone/calcium content in women's magazine would exceed that found in teen-focused magazines. Conversely, given the body-image emphasis of teen-focused magazines (Wiseman et al. 1992), the weight loss content in teen-focused magazines would be expected to exceed similar information published in women's magazines. These hypotheses are shown in Table 2 on page 4.

Magazine analysis included frequency of ads, articles and columns and measurement of area in a quarterly sampling (March, June, September and December) of the four magazines over two four-year periods (1986-89 and 1991-94). This time span enabled the impact, if any, of the increased and expanded 1989 calcium RDAs for young women

(from 800 mg/d to 1200 mg/d) to be analyzed. The 128 magazine collection produced 611 total calcium and weight loss occurrences (ads, articles and columns). Ninety-five percent of all calcium area (10,835.66 sq. in.) located in 95 occurrences was found in women's magazines versus 5% (533.45 sq. in.) of calcium area located in a total of 11 occurrences found in teen-focused magazines. The primary source of calcium information in women's magazines was advertising.

Nearly 60% of all weight loss information observed during this study was found in teen-focused magazines (23,610.79 sq. in.) located in 313 occurrences. Approximately 40% (16,671.84 sq. in.) of weight loss information located in 192 occurrences was published in women's magazines. The primary source of weight loss information in teen-focused and women's magazines was advertising.

Statistical analysis by two-way ANOVA failed to show any significant change in calcium content due to increased 1989 calcium RDAs ($p<.05$). Three-way ANOVA analysis for calcium count and area was significant by magazine month (March, June, September and December), by type (teen-focused vs. women's) and by year (1986, 87, 88, 89, 91, 92, 93 and 94). Three-way ANOVA for weight loss count was significant by magazine month and type ($p<.05$). Three-way ANOVA analysis, which revealed interactions as well as main effects, enabled more complex comparisons to be made. An important finding, however, was the significant difference between teen-focused and women's magazines for calcium count and area and for weight loss count which were all tested with $p < .05$ and observed to be significant with $p <.001$.

Thus, expected study outcome (Table 2) was clearly borne out by the data and is shown below in Tables 20 and 21. The outcome was as hypothesized: A > B and D > C for both occurrences and area.

Table 20. Study Outcome by Occurrence.

Content	Women's Magazines	Teen-Focused Magazines
Bone / Calcium	A = 95	B = 11
Weight Loss	C =192	D =313

Table 21. Study Outcome by Area.

Content	Women's Magazines	Teen-Focused Magazines
Bone / Calcium	A = 10302.2 sq.in.	B = 533.45 sq.in.
Weight Loss	C = 16671.84 sq.in.	D = 23610.79 sq.in.

There was disproportionate calcium and weight loss coverage between teen-focused vs. women's magazines. Calcium coverage in ads and articles in women's magazines exceeds similar coverage in teen-focused magazines and weight loss coverage in ads and articles in teen-focused magazines exceeds similar coverage in women's magazines. The calcium message had not been delivered to those best able to benefit.

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APPENDIX A. SAMPLE DATA COLLECTION FORM

Magazine Name: *Ladies Home Journal* *Mademoiselle*
Good Housekeeping *Seventeen*

Magazine Month: *March* *June* *September* *December*
Magazine Year: *1986* *1987* *1988* *1989* *1990* *1991* *1992* *1993* *1994*

Page #	Content		Type (1=Yes, Blank=0=No)					Height (in.)	Width (in.)	Area (computed)	Notes
	Weight Loss	Calcium	Ad, Article, Column	Text	B/W Photo	Color Photo of Product	Color Photo of Model				
36	1		Ad	1		1	1	4	5	20	
71	1	1	Art	1				2.5	5.5	13.75	
100		1	Col	1	1			8	10	80	

APPENDIX B. MAGAZINE PUBLISHER INQUIRY LETTER

August 1, 1994

Sandra Lee Spaeth, Associate Publisher/Advertising Director
Good Housekeeping
The Hearst Corporation
959 8th Avenue
New York, New York 10019

Dear Ms. Spaeth:

I am a graduate student in Human Nutrition and Foods at Virginia Polytechnic Institute at Falls Church, Virginia.

One of the several possible research projects I am considering would examine nutritional aspects of magazine articles and advertising. Good Housekeeping is one of the magazines I would like to include in my study. In order to accomplish this project, I need information on demographics and circulation during the last ten years. Specifically, what is the age range of your readership including mean and median, if available.

Over the years, I have often referred to Good Housekeeping for articles on food and nutrition, and hope, once again, your magazine can provide the information I need.

Thank you for your assistance. I look forward to hearing from you.

Sincerely,

Mary Korinis, R. D.
8870 Woodland Drive
Silver Spring, MD 20910
301-565-1065 phone/fax

APPENDIX C. CHI-SQUARE RESULTS

CROSS TABULATION 1. Frequency of Calcium and Weight loss Occurrences

Counts Section

	Type		
Subj	**Teen-Focused**	**Women's**	**Total**
Ca	11	95	106
Wt	313	192	505
Total	324	287	611

The number of rows with at least one missing value is 0

Chi-Square Contribution Section

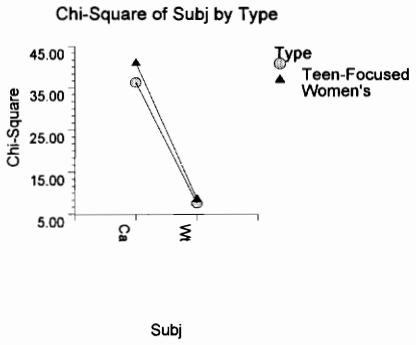
	Type		
Subj	**Teen-Focused**	**Women's**	**Total**
Ca	36.36	41.05	77.41
Wt	7.63	8.62	16.25
Total	43.99	49.67	93.66

The number of rows with at least one missing value is 0

Chi-Square Statistics Section

Chi-Square	93.660991	
Degrees of Freedom	1.000000	
Probability Level	0.000000	Reject Ho

Plots Section



CROSS TABULATION 2. Frequency of Calcium and Weight Loss Areas

Counts Section

	Type		
Subj	**Teen-Focused**	**Women's**	**Total**
Ca	533.4531	10302.2	10835.66
Wt	23610.79	16671.84	40282.63
Total	24144.24	26974.05	51118.29

The number of rows with at least one missing value is 0

Chi-Square Contribution Section

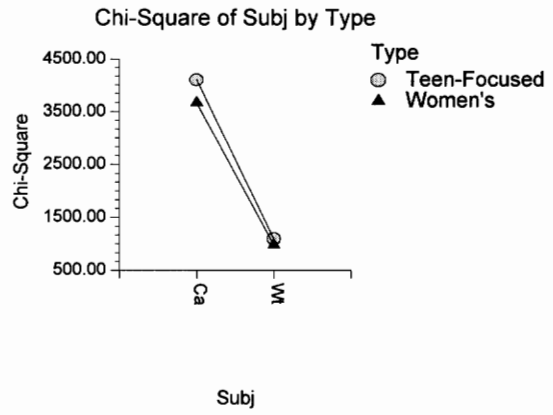
	Type		
Subj	**Teen-Focused**	**Women's**	**Total**
Ca	4106.60	3675.79	7782.39
Wt	1104.64	988.75	2093.39
Total	5211.24	4664.54	9875.78

The number of rows with at least one missing value is 0

Chi-Square Statistics Section

Chi-Square	9875.783602	
Degrees of Freedom	1.000000	
Probability Level	0.000000	Reject Ho

Plots Section



APPENDIX D. ANOVA RESULTS

Note: Means and Effects Sections for all ANOVAs include interaction effects only when significant as indicated by *.

ANOVA 1. Three-Way Analysis of Variance Report Response - Calcium Count

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	13.53125	4.510417	5.15	0.002965*	0.637373
B (Mag Type)	1	55.125	55.125	63.00	0.000000*	0.999870
AB	3	6.8125	2.270833	2.60	0.060081	0.349580
C (Mag Yr)	7	15.71875	2.245536	2.57	0.021446*	0.564373
AC	21	10.46875	0.4985119	0.57	0.924176	0.242968
BC	7	12.875	1.839286	2.10	0.055871	0.467914
ABC	21	11.6875	0.5565476	0.64	0.875692	0.272887
S	64	56	0.875			
Total (Adjusted)	127	182.2188				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	0.828125		0.828125
A: Mag Mo				
3	32	1.21875	0.1653595	0.390625
6	32	0.75	0.1653595	-0.078125
9	32	1	0.1653595	0.171875
12	32	0.34375	0.1653595	-0.484375
B: Mag Type				
T	64	0.171875	0.1169268	-0.65625
W	64	1.484375	0.1169268	0.65625
C: Mag Yr				
86	16	1.5	0.2338536	0.671875
87	16	0.375	0.2338536	-0.453125
88	16	0.6875	0.2338536	-0.140625
89	16	0.8125	0.2338536	-0.015625
91	16	0.5	0.2338536	-0.328125
92	16	0.8125	0.2338536	-0.015625
93	16	0.6875	0.2338536	-0.140625
94	16	1.25	0.2338536	0.421875

ANOVA 2. Three-Way Analysis of Variance Report Response - Calcium Area

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	146680.9	48893.63	5.33	0.002420*	0.653901
B (Type)	1	745535.1	745535.1	81.32	0.000000*	0.999995
AB	3	102615.2	34205.06	3.73	0.015498*	0.487343
C (Mag Yr)	7	195542.8	27934.68	3.05	0.007874*	0.653729
AC	21	226596.3	10790.3	1.18	0.301061	0.529577
BC	7	157786.5	22540.93	2.46	0.026821*	0.542783
ABC	21	257342.4	12254.4	1.34	0.186816	0.600335
S	64	586755.6	9168.056			
Total (Adjusted)	127	2418855				
Total	128					
* Term significant at alpha = 0.05						

Means and Effects Section Term	Count	Mean	Standard Error	Effect
All	128	84.65357		84.65357
A: Mag Mo				
3	32	120.1167	16.92636	35.46315
6	32	84.09863	16.92636	-0.5549365
9	32	104.0542	16.92636	19.40063
12	32	30.34473	16.92636	-54.30884
B: Type				
Teen-Focused	64	8.335205	11.96875	-76.31837
Women's	64	160.9719	11.96875	76.31837
C: Mag Yr				
86	16	143.7432	23.93749	59.0896
87	16	22.67188	23.93749	-61.98169
88	16	74.64063	23.93749	-10.01294
89	16	72.54203	23.93749	-12.11154
91	16	37.52734	23.93749	-47.12622
92	16	90.98438	23.93749	6.330806
93	16	107.2012	23.93749	22.5476
94	16	127.918	23.93749	43.2644
AB: Mag Mo,Type				
3,Teen-Focused	16	17.71289	23.93749	-26.08546
3,Women's	16	222.5206	23.93749	26.08546
6,Teen-Focused	16	0	23.93749	-7.780269
6,Women's	16	168.1973	23.93749	7.780269
9,Teen-Focused	16	13.90918	23.93749	-13.82666
9,Women's	16	194.1992	23.93749	13.82666
12,Teen-Focused	16	1.71875	23.93749	47.69239
12,Women's	16	58.9707	23.93749	-47.69239
BC: Type,Mag Yr				
Teen-Focused,86	8	36.5332	33.85273	-30.8916
Teen-Focused,87	8	8.835938	33.85273	62.48243
Teen-Focused,88	8	0	33.85273	1.677739
Teen-Focused,89	8	10.875	33.85273	14.65133
Teen-Focused,91	8	0	33.85273	38.79102
Teen-Focused,92	8	4.5	33.85273	-10.16601
Teen-Focused,93	8	3.75	33.85273	-27.13281
Teen-Focused,94	8	2.1875	33.85273	-49.41211
Women's,86	8	250.9531	33.85273	30.8916
Women's,87	8	36.50781	33.85273	-62.48243
Women's,88	8	149.2813	33.85273	-1.677739
Women's,89	8	134.2091	33.85273	-14.65133
Women's,91	8	75.05469	33.85273	-38.79102
Women's,92	8	177.4688	33.85273	10.16601
Women's,93	8	210.6523	33.85273	27.13281
Women's,94	8	253.6484	33.85273	49.41211

ANOVA 3. Three-Way Analysis of Variance Report Response - Weight Loss Counts

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	126.2734	42.09114	8.88	0.000053*	0.878976
B (Type)	1	114.3828	114.3828	24.12	0.000007*	0.934892
AB	3	24.77344	8.257813	1.74	0.167420	0.242303
C (Mag Yr)	7	36.30469	5.186384	1.09	0.377972	0.244452
AC	21	57.28906	2.728051	0.58	0.920635	0.245431
BC	7	25.30469	3.614955	0.76	0.620746	0.175634
ABC	21	50.78906	2.418527	0.51	0.956289	0.216947
S	64	303.5	4.742188			
Total (Adjusted)	127	738.6172				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	3.945313		3.945313
A: Mag Mo				
3	32	4.59375	0.3849589	0.6484375
6	32	5.1875	0.3849589	1.242188
9	32	3.3125	0.3849589	-0.6328125
12	32	2.6875	0.3849589	-1.257813
B: Type				
Teen-Focused	64	4.890625	0.2722071	0.9453125
Women's	64	3	0.2722071	-0.9453125
C: Mag Yr				
86	16	4.75	0.5444141	0.8046875
87	16	3.75	0.5444141	-0.1953125
88	16	4.0625	0.5444141	0.1171875
89	16	4.6875	0.5444141	0.7421875
91	16	3.8125	0.5444141	-0.1328125
92	16	3.625	0.5444141	-0.3203125
93	16	3	0.5444141	-0.9453125
94	16	3.875	0.5444141	-0.0703125

ANOVA 4. Three-Way Analysis of Variance Report Response - Weight Loss Area

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	491294.7	163764.9	1.67	0.182113	0.233541
B (Type)	1	376163.3	376163.3	3.84	0.054471	0.283282
AB	3	169828.2	56609.41	0.58	0.631869	0.106154
C (Mag Yr)	7	552444.8	78920.69	0.81	0.586092	0.184193
AC	21	834432	39734.86	0.41	0.988107	0.173955
BC	7	538673.4	76953.35	0.79	0.602244	0.180172
ABC	21	1271016	60524.56	0.62	0.890585	0.264416
S	64	6273116	98017.44			
Total (Adjusted)	127	1.050697E+07				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	314.708		314.708
A: Mag Mo				
3	32	312.6245	55.34478	-2.083527
6	32	409.282	55.34478	94.57394
9	32	301.0753	55.34478	-13.63272
12	32	235.8503	55.34478	-78.8577
B: Type				
Teen-Focused	64	368.9185	39.13467	54.21048
Women's	64	260.4976	39.13467	-54.21048
C: Mag Yr				
86	16	466.1848	78.26934	151.4768
87	16	316.063	78.26934	1.35495
88	16	306.5977	78.26934	-8.110382
89	16	336.4287	78.26934	21.72067
91	16	273.9253	78.26934	-40.78275
92	16	282.2461	78.26934	-32.46194
93	16	223.4814	78.26934	-91.22659
94	16	312.7373	78.26934	-1.970734

ANOVA 5. Two-Way Analysis of Variance Report for Pre- and Post-RDA Response - Calcium Count

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Type)	1	55.125	55.125	53.80	0.000000*	1.000000
B (RDA Timing)	1	0.03125	0.03125	0.03	0.861653	0.053393
AB	1	0	0	0.00	1.000000	0.050000
S	124	127.0625	1.024698			
Total (Adjusted)	127	182.2188				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	0.828125		0.828125
A: Mag Type				
T	64	0.171875	0.1265342	-0.65625
W	64	1.484375	0.1265342	0.65625
B: RDA Timing				
Before	64	0.84375	0.1265342	0.015625
Post	64	0.8125	0.1265342	-0.015625

ANOVA 6. Two-Way Analysis of Variance Report for Pre- and Post RDA Response - Calcium Area

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Type)	1	808117.8	808117.8	56.03	0.000000*	1.000000
B (RDA Timing)	1	5298.064	5298.064	0.37	0.545571	0.091681
AB	1	20566.46	20566.46	1.43	0.234709	0.217269
S	124	1788477	14423.2			
Total (Adjusted)	127	2622459				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	88.30859		88.30859
A: Mag Type				
T	64	8.851563	15.01208	-79.45703
W	64	167.7656	15.01208	79.45703
B: RDA Timing				
Before	64	81.875	15.01208	-6.433594
Post	64	94.74219	15.01208	6.433594

ANOVA 7. Three-Way Analysis of Variance Report Response - Calcium Ad Count

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	7.09375	2.364583	4.32	0.007728*	0.553525
B (Type)	1	47.53125	47.53125	86.91	0.000000*	0.999998
AB	3	6.34375	2.114583	3.87	0.013204*	0.502921
C (Mag Yr)	7	11.96875	1.709821	3.13	0.006670*	0.667330
AC	21	6.40625	0.3050595	0.56	0.931457	0.237706
BC	7	9.96875	1.424107	2.60	0.019827*	0.571815
ABC	21	7.15625	0.3407738	0.62	0.886165	0.266982
S	64	35	0.546875			
Total (Adjusted)	127	131.4688				
Total	128					
* Term significant at alpha = 0.05						

Means and Effects Section Term	Count	Mean	Standard Error	Effect
All	128	0.640625		0.640625
A: Mag Mo				
3	32	0.90625	0.1307281	0.265625
6	32	0.59375	0.1307281	-0.046875
9	32	0.78125	0.1307281	0.140625
12	32	0.28125	0.1307281	-0.359375
B: Type				
Teen-Focused	64	0.03125	9.243875E-02	-0.609375
Women's	64	1.25	9.243875E-02	0.609375
C: Mag Yr				
86	16	1.1875	0.1848775	0.546875
87	16	0.25	0.1848775	-0.390625
88	16	0.5625	0.1848775	-0.078125
89	16	0.6875	0.1848775	0.046875
91	16	0.375	0.1848775	-0.265625
92	16	0.5	0.1848775	-0.140625
93	16	0.5	0.1848775	-0.140625
94	16	1.0625	0.1848775	0.421875
AB: Mag Mo,Type				
3,Teen-Focused	16	0	0.1848775	-0.296875
3,Women's	16	1.8125	0.1848775	0.296875
6,Teen-Focused	16	0	0.1848775	0.015625
6,Women's	16	1.1875	0.1848775	-0.015625
9,Teen-Focused	16	0.125	0.1848775	-0.046875
9,Women's	16	1.4375	0.1848775	0.046875
12,Teen-Focused	16	0	0.1848775	0.328125
12,Women's	16	0.5625	0.1848775	-0.328125
BC: Type,Mag Yr				
Teen-Focused,86	8	0.125	0.2614563	-0.453125
Teen-Focused,87	8	0	0.2614563	0.359375
Teen-Focused,88	8	0	0.2614563	0.046875
Teen-Focused,89	8	0.125	0.2614563	0.046875
Teen-Focused,91	8	0	0.2614563	0.234375
Teen-Focused,92	8	0	0.2614563	0.109375
Teen-Focused,93	8	0	0.2614563	0.109375
Teen-Focused,94	8	0	0.2614563	-0.453125
Women's,86	8	2.25	0.2614563	0.453125
Women's,87	8	0.5	0.2614563	-0.359375
Women's,88	8	1.125	0.2614563	-0.046875
Women's,89	8	1.25	0.2614563	-0.046875
Women's,91	8	0.75	0.2614563	-0.234375
Women's,92	8	1	0.2614563	-0.109375
Women's,93	8	1	0.2614563	-0.109375
Women's,94	8	2.125	0.2614563	0.453125

ANOVA 8. Three-Way Analysis of Variance Report Response - Calcium Article Count

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	0.3984375	0.1328125	1.00	0.398697	0.152950
B (Type)	1	0.0703125	0.0703125	0.53	0.469508	0.080857
AB	3	0.5859375	0.1953125	1.47	0.230908	0.208915
C (Mag Yr)	7	0.5546875	7.924107E-02	0.60	0.756324	0.143774
AC	21	1.539063	7.328869E-02	0.55	0.934961	0.235067
BC	7	0.7421875	0.1060268	0.80	0.591589	0.182818
ABC	21	2.851563	0.1357887	1.02	0.451359	0.457119
S	64	8.5	0.1328125			
Total (Adjusted)	127	15.24219				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	0.1171875		0.1171875
A: Mag Mo				
3	32	0.1875	6.442352E-02	0.0703125
6	32	0.125	6.442352E-02	0.0078125
9	32	0.125	6.442352E-02	0.0078125
12	32	0.03125	6.442352E-02	-0.0859375
B: Type				
Teen-Focused	64	0.09375	4.555431E-02	-0.0234375
Women's	64	0.140625	4.555431E-02	0.0234375
C: Mag Yr				
86	16	0.1875	9.110862E-02	0.0703125
87	16	0.0625	9.110862E-02	-0.0546875
88	16	0.0625	9.110862E-02	-0.0546875
89	16	0.0625	9.110862E-02	-0.0546875
91	16	0.125	9.110862E-02	0.0078125
92	16	0.25	9.110862E-02	0.1328125
93	16	0.125	9.110862E-02	0.0078125
94	16	0.0625	9.110862E-02	-0.0546875

ANOVA 9. Three-Way Analysis of Variance Report Response - Calcium Column Count

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	0.2109375	0.0703125	1.00	0.398697	0.152950
B (Type)	1	0.0703125	0.0703125	1.00	0.321076	0.108995
AB	3	0.1484375	4.947917E-02	0.70	0.553306	0.119704
C (Mag Yr)	7	0.1796875	2.566964E-02	0.37	0.919198	0.103040
AC	21	1.226563	5.840774E-02	0.83	0.673512	0.364794
BC	7	0.7421875	0.1060268	1.51	0.180623	0.336023
ABC	21	1.289063	6.138393E-02	0.87	0.623490	0.385205
S	64	4.5	0.0703125			
Total (Adjusted)	127	8.367188				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	0.0703125		0.0703125
A: Mag Mo				
3	32	0.125	0.046875	0.0546875
6	32	0.03125	0.046875	-0.0390625
9	32	0.09375	0.046875	0.0234375
12	32	0.03125	0.046875	-0.0390625
B: Type				
Teen-Focused	64	0.046875	3.314563E-02	-0.0234375
Women's	64	0.09375	3.314563E-02	0.0234375
C: Mag Yr				
86	16	0.125	6.629126E-02	0.0546875
87	16	0.0625	6.629126E-02	-0.0078125
88	16	0.0625	6.629126E-02	-0.0078125
89	16	0.0625	6.629126E-02	-0.0078125
91	16	0	6.629126E-02	-0.0703125
92	16	0.0625	6.629126E-02	-0.0078125
93	16	0.0625	6.629126E-02	-0.0078125
94	16	0.125	6.629126E-02	0.0546875

ANOVA 10. Three-Way Analysis of Variance Report Response - Weight Loss Ad Count

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	69.4375	23.14583	5.11	0.003127*	0.632955
B (Type)	1	12.5	12.5	2.76	0.101623	0.217038
AB	3	39.5625	13.1875	2.91	0.041164*	0.388847
C (Mag Yr)	7	6.375	0.9107143	0.20	0.984143	0.077350
AC	21	32.6875	1.556548	0.34	0.995882	0.150348
BC	7	12.875	1.839286	0.41	0.895247	0.109862
ABC	21	26.5625	1.264881	0.28	0.999039	0.127418
S	64	290	4.53125			
Total (Adjusted)	127	490				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	2		2
A: Mag Mo				
3	32	2.71875	0.3762998	0.71875
6	32	2.75	0.3762998	0.75
9	32	1.34375	0.3762998	-0.65625
12	32	1.1875	0.3762998	-0.8125
B: Type				
Teen-Focused	64	2.3125	0.2660842	0.3125
Women's	64	1.6875	0.2660842	-0.3125
C: Mag Yr				
86	16	2.25	0.5321683	0.25
87	16	1.5	0.5321683	-0.5
88	16	2.125	0.5321683	0.125
89	16	2.125	0.5321683	0.125
91	16	2.125	0.5321683	0.125
92	16	2	0.5321683	0
93	16	1.8125	0.5321683	-0.1875
94	16	2.0625	0.5321683	0.0625
AB: Mag Mo,Type				
3,Teen-Focused	16	3.4375	0.5321683	0.40625
3,Women's	16	2	0.5321683	-0.40625
6,Teen-Focused	16	3.75	0.5321683	0.6875
6,Women's	16	1.75	0.5321683	-0.6875
9,Teen-Focused	16	1.125	0.5321683	-0.53125
9,Women's	16	1.5625	0.5321683	0.53125
12,Teen-Focused	16	0.9375	0.5321683	-0.5625
12,Women's	16	1.4375	0.5321683	0.5625

ANOVA 11. Three-Way Analysis of Variance Report Response - Weight Loss Article Count

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	7.1875	2.395833	1.18	0.324580	0.173908
B (Type)	1	16.53125	16.53125	8.14	0.005830*	0.523064
AB	3	1.78125	0.59375	0.29	0.830800	0.077109
C (Mag Yr)	7	11.5	1.642857	0.81	0.583193	0.184922
AC	21	8.1875	0.389881	0.19	0.999948	0.099243
BC	7	9.09375	1.299107	0.64	0.721506	0.151831
ABC	21	15.59375	0.7425596	0.37	0.993797	0.158594
S	64	130	2.03125			
Total (Adjusted)	127	199.875				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	1.21875		1.21875
A: Mag Mo				
3	32	1.34375	0.2519456	0.125
6	32	1.40625	0.2519456	0.1875
9	32	1.3125	0.2519456	0.09375
12	32	0.8125	0.2519456	-0.40625
B: Type				
Teen-Focused	64	1.578125	0.1781524	0.359375
Women's	64	0.859375	0.1781524	-0.359375
C: Mag Yr				
86	16	1.75	0.3563048	0.53125
87	16	1.625	0.3563048	0.40625
88	16	1.125	0.3563048	-0.09375
89	16	1.25	0.3563048	0.03125
91	16	0.8125	0.3563048	-0.40625
92	16	1	0.3563048	-0.21875
93	16	1	0.3563048	-0.21875
94	16	1.1875	0.3563048	-0.03125

ANOVA 12. Three-Way Analysis of Variance Report Response - Weight Loss Column Count

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	4.398438	1.466146	1.86	0.145622	0.256866
B (Type)	1	9.570313	9.570313	12.13	0.000901*	0.692571
AB	3	0.3984375	0.1328125	0.17	0.917379	0.065255
C (Mag Yr)	7	11.11719	1.58817	2.01	0.066983	0.448490
AC	21	11.16406	0.5316221	0.67	0.842535	0.290282
BC	7	6.867188	0.9810268	1.24	0.292840	0.277076
ABC	21	11.41406	0.5435268	0.69	0.828242	0.297315
S	64	50.5	0.7890625			
Total (Adjusted)	127	105.4297				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	0.7265625		0.7265625
A: Mag Mo				
3	32	0.53125	0.1570293	-0.1953125
6	32	1.03125	0.1570293	0.3046875
9	32	0.65625	0.1570293	-0.0703125
12	32	0.6875	0.1570293	-0.0390625
B: Type				
Teen-Focused	64	1	0.1110365	0.2734375
Women's	64	0.453125	0.1110365	-0.2734375
C: Mag Yr				
86	16	0.75	0.222073	0.0234375
87	16	0.625	0.222073	-0.1015625
88	16	0.8125	0.222073	0.0859375
89	16	1.3125	0.222073	0.5859375
91	16	0.875	0.222073	0.1484375
92	16	0.625	0.222073	-0.1015625
93	16	0.1875	0.222073	-0.5390625
94	16	0.625	0.222073	-0.1015625

ANOVA 13. Three-Way Analysis of Variance Report Response - Calcium Ad Area

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	105487.2	35162.41	7.09	0.000345*	0.788936
B (Type)	1	617331.9	617331.9	124.52	0.000000*	1.000000
AB	3	91745.34	30581.78	6.17	0.000948*	0.724305
C (Mag Yr)	7	171054.4	24436.34	4.93	0.000169*	0.882796
AC	21	161958.9	7712.329	1.56	0.090503	0.687816
BC	7	161930.5	23132.93	4.67	0.000285*	0.861519
ABC	21	174643.3	8316.349	1.68	0.058955	0.730934
S	64	317293.3	4957.708			
Total (Adjusted)	127	1801445				
Total	128					
* Term significant at alpha = 0.05						

Means and Effects Section Term	Count	Mean	Standard Error	Effect
All	128	72.18713		72.18713
A: Mag Mo				
3	32	100.4736	12.44702	28.2865
6	32	63.27051	12.44702	-8.916626
9	32	95.88818	12.44702	23.70105
12	32	29.11621	12.44702	-43.07092
B: Type				
Teen-Focused	64	2.73999	8.801373	-69.44714
Women's	64	141.6343	8.801373	69.44714
C: Mag Yr				
86	16	118.8857	17.60275	46.69861
87	16	18.25391	17.60275	-53.93323
88	16	53.53125	17.60275	-18.65588
89	16	59.26172	17.60275	-12.92542
91	16	31.42188	17.60275	-40.76526
92	16	72.49219	17.60275	0.3050537
93	16	99.95117	17.60275	27.76404
94	16	123.6992	17.60275	51.51208
AB: Mag Mo,Type				
3,Teen-Focused	16	0	17.60275	-31.02649
3,Women's	16	200.9473	17.60275	31.02649
6,Teen-Focused	16	0	17.60275	6.176636
6,Women's	16	126.541	17.60275	-6.176636
9,Teen-Focused	16	10.95996	17.60275	-15.48108
9,Women's	16	180.8164	17.60275	15.48108
12,Teen-Focused	16	0	17.60275	40.33093
12,Women's	16	58.23242	17.60275	-40.33093
BC: Type,Mag Yr				
Teen-Focused,86	8	11.04492	24.89404	-38.39368
Teen-Focused,87	8	0	24.89404	51.19324
Teen-Focused,88	8	0	24.89404	15.91589
Teen-Focused,89	8	10.875	24.89404	21.06042
Teen-Focused,91	8	0	24.89404	38.02527
Teen-Focused,92	8	0	24.89404	-3.045044
Teen-Focused,93	8	0	24.89404	-30.50403
Teen-Focused,94	8	0	24.89404	-54.25208
Women's,86	8	226.7266	24.89404	38.39368
Women's,87	8	36.50781	24.89404	-51.19324
Women's,88	8	107.0625	24.89404	-15.91589
Women's,89	8	107.6484	24.89404	-21.06042
Women's,91	8	62.84375	24.89404	-38.02527
Women's,92	8	144.9844	24.89404	3.045044
Women's,93	8	199.9023	24.89404	30.50403
Women's,94	8	247.3984	24.89404	54.25208

ANOVA 14. Three-Way Analysis of Variance Report Response - Calcium Article Area

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	7924.938	2641.646	1.32	0.276352	0.190396
B (Type)	1	5182.304	5182.304	2.59	0.112796	0.206314
AB	3	8287.232	2762.411	1.38	0.257512	0.197662
C (Mag Yr)	7	7381.227	1054.461	0.53	0.811669	0.130840
AC	21	33851.61	1611.981	0.80	0.704465	0.352016
BC	7	8980.656	1282.951	0.64	0.721163	0.151911
ABC	21	41699.47	1985.689	0.99	0.486573	0.441856
S	64	128299.3	2004.677			
Total (Adjusted)	127	241606.8				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	10.82239		10.82239
A: Mag Mo				
3	32	16.76809	7.914933	5.945693
6	32	19.89063	7.914933	9.068233
9	32	6.261719	7.914933	-4.560674
12	32	0.3691406	7.914933	-10.45325
B: Type				
Teen-Focused	64	4.459473	5.596703	-6.36292
Women's	64	17.18531	5.596703	6.36292
C: Mag Yr				
86	16	21.31055	11.19341	10.48815
87	16	2.71875	11.19341	-8.103642
88	16	20.67188	11.19341	9.849483
89	16	11.78031	11.19341	0.9579199
91	16	6.105469	11.19341	-4.716924
92	16	17.36719	11.19341	6.544795
93	16	5.53125	11.19341	-5.291142
94	16	1.09375	11.19341	-9.728642

ANOVA 15. Three-Way Analysis of Variance Report Response - Calcium Column Area

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	86.33261	28.77754	0.64	0.593919	0.112492
B (Type)	1	33.07132	33.07132	0.73	0.395408	0.092904
AB	3	118.0323	39.3441	0.87	0.460895	0.138239
C (Mag Yr)	7	164.3425	23.4775	0.52	0.816440	0.129706
AC	21	848.9747	40.42737	0.89	0.597543	0.395769
BC	7	477.2395	68.17707	1.51	0.180207	0.336297
ABC	21	817.275	38.91786	0.86	0.637169	0.379637
S	64	2891.236	45.17557			
Total (Adjusted)	127	5436.504				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	1.644043		1.644043
A: Mag Mo				
3	32	2.875	1.188165	1.230957
6	32	0.9375	1.188165	-0.706543
9	32	1.904297	1.188165	0.2602539
12	32	0.859375	1.188165	-0.784668
B: Type				
Teen-Focused	64	1.135742	0.8401597	-0.5083008
Women's	64	2.152344	0.8401597	0.5083008
C: Mag Yr				
86	16	3.546875	1.680319	1.902832
87	16	1.699219	1.680319	5.517578E-02
88	16	0.4375	1.680319	-1.206543
89	16	1.5	1.680319	-0.144043
91	16	0	1.680319	-1.644043
92	16	1.125	1.680319	-0.519043
93	16	1.71875	1.680319	7.470703E-02
94	16	3.125	1.680319	1.480957

ANOVA 16. Three-Way Analysis of Variance Report Response - Weight Loss Ad Area

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	3023.137	1007.712	0.10	0.961319	0.058685
B (Type)	1	35122.07	35122.07	3.39	0.070359	0.255734
AB	3	16529.15	5509.716	0.53	0.662443	0.101289
C (Mag Yr)	7	76468.5	10924.07	1.05	0.403716	0.235803
AC	21	108567.1	5169.864	0.50	0.961219	0.212059
BC	7	14727.51	2103.93	0.20	0.983703	0.077629
ABC	21	207106	9862.189	0.95	0.531685	0.422843
S	64	663703.8	10370.37			
Total (Adjusted)	127	1125247				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	73.43622		73.43622
A: Mag Mo				
3	32	67.93652	18.00206	-5.499695
6	32	79.76172	18.00206	6.3255
9	32	69.56836	18.00206	-3.867859
12	32	76.47827	18.00206	3.042053
B: Type				
Teen-Focused	64	56.87146	12.72938	-16.56476
Women's	64	90.00098	12.72938	16.56476
C: Mag Yr				
86	16	113.29	25.45876	39.85382
87	16	56.58301	25.45876	-16.85321
88	16	94.28125	25.45876	20.84503
89	16	76.37402	25.45876	2.937805
91	16	92.78369	25.45876	19.34747
92	16	71.91113	25.45876	-1.525085
93	16	41.4248	25.45876	-32.01141
94	16	40.8418	25.45876	-32.59442

ANOVA 17. Three-Way Analysis of Variance Report Response - Weight Loss Article Area

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	457176.2	152392.1	2.03	0.117984	0.278898
B (Type)	1	440051.6	440051.6	5.87	0.018217*	0.402980
AB	3	140485.2	46828.41	0.62	0.601499	0.111197
C (Mag Yr)	7	387971.1	55424.45	0.74	0.639250	0.171162
AC	21	662302.3	31538.2	0.42	0.985081	0.180092
BC	7	542956	77565.15	1.04	0.415783	0.231902
ABC	21	1089241	51868.61	0.69	0.824974	0.298891
S	64	4795728	74933.24			
Total (Adjusted)	127	8515910				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	211.1478		211.1478
A: Mag Mo				
3	32	226.8467	48.39074	15.69888
6	32	293.8621	48.39074	82.71426
9	32	196.2638	48.39074	-14.884
12	32	127.6187	48.39074	-83.52914
B: Type				
Teen-Focused	64	269.7814	34.21742	58.63364
Women's	64	152.5142	34.21742	-58.63364
C: Mag Yr				
86	16	334.2385	68.43484	123.0907
87	16	236.6323	68.43484	25.48453
88	16	180.0439	68.43484	-31.10385
89	16	219.0479	68.43484	7.900055
91	16	136.0381	68.43484	-75.10971
92	16	185.5938	68.43484	-25.55405
93	16	178.5723	68.43484	-32.57553
94	16	219.0156	68.43484	7.867828

ANOVA 18. Three-Way Analysis of Variance Report Response - Weight Loss Column Area

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power
A (Mag Mo)	3	6731.288	2243.763	0.79	0.501598	0.129661
B (Type)	1	18869.57	18869.57	6.68	0.012045*	0.447554
AB	3	216.0909	72.03031	0.03	0.994443	0.052246
C (Mag Yr)	7	28613.87	4087.695	1.45	0.202512	0.322348
AC	21	33821.6	1610.552	0.57	0.923951	0.243126
BC	7	40694.59	5813.513	2.06	0.061134	0.458320
ABC	21	23032.74	1096.797	0.39	0.990899	0.167264
S	64	180807.2	2825.113			
Total (Adjusted)	127	332787				
Total	128					

* Term significant at alpha = 0.05

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	128	30.12402		30.12402
A: Mag Mo				
3	32	17.84131	9.395998	-12.28271
6	32	35.6582	9.395998	5.53418
9	32	35.24316	9.395998	5.119141
12	32	31.75342	9.395998	1.629395
B: Type				
Teen-Focused	64	42.26563	6.643974	12.1416
Women's	64	17.98242	6.643974	-12.1416
C: Mag Yr				
86	16	18.65625	13.28795	-11.46777
87	16	22.84766	13.28795	-7.276367
88	16	32.27246	13.28795	2.148438
89	16	41.00684	13.28795	10.88281
91	16	45.10352	13.28795	14.97949
92	16	24.74121	13.28795	-5.382813
93	16	3.484375	13.28795	-26.63965
94	16	52.87988	13.28795	22.75586

VITA

Education

Master of Science Candidate, Human Nutrition and Foods, Virginia Polytechnic Institute and State University, (1994-present).
B.S. (Home Economics) Hood College 1989.
Coordinated Undergraduate Program in General Dietetics.
Minor in Gerontology.
Class Standing = 13 of 261. CPR = 3.9/4.0
Certificate: Clinical Management, Marriott Corp. 1989.
Certified Food Service Manager, State of Maryland.

Clinical Dietitian

ICU and Nutrition Support Team Dietitian at Capitol Hill Hospital, Washington, D.C. (1989-90).

Manager, Food Service

Assistant Manager of Foodservice Operations for National Geographic Society in Gaithersburg, MD (1990-1993).

Consulting Dietitian

Under contract with Audits International, Chicago, IL to conduct safety and sanitation inspections at fast food restaurants (1994-present).

District 18 Coordinator- Maryland Dietetic Association
Lobbied for successful passage of SB 673 entitled Insurance: Dietitians and Nutritionists - Reimbursement and Coverage. (1991-1993).

Associations

The American Dietetic Association (ADA)
ADA: Consulting Nutritionists, Private Practice
Virginia Dietetic Association
Maryland Dietetic Association
Sigma Phi Omega (Gerontology Honorary)
Kappa Omicron Phi (Home Economics Honorary)
Currently licensed to practice Dietetics in Maryland and District of Columbia.

Signature

Mary Barbara Emma Korinis
172-38-5522