DOCUMENT RESUME

ED 192 924 PS 011 755

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TITLE How Television Commercials Affect Children's Attitudes and Eating Behavior.
SPONS AGENCY Department of Agriculture, Washington, D.C.: Montana Univ., Missoula. Research Advisory Council.
PUB DATE Sep 80
GRANT 729-46: 5901-0410-8-0070-0
NOTE 33p.: Paper presented at the Annual Convention of the American Psychological Association (88th, Montreal, Quebec, Canada, September 1-5, 1980).

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Age Differences: *Attitudes: *Children: *Food: *Influences: Nutrition: Sex Differences: *Television Commercials: *Television Viewing
IDENTIFIERS *Food Consumption

ABSTRACT

The effect of various kinds of commercials on children's actual food consumption are examined in this study. Forty-eight 4-year-old children (mean age, 4.65 years), and forty-eight 9-year-old children (mean age, 9.78 years) comprised the sample. In both age groups there was an equal number of boys and girls. The variable investigated was type of advertisement (low-nutritional, pro-nutritional, non-food control), and the effects of the advertisement were assessed via a behavioral eating test, a food attitude scale, and an interview. Results suggest that both 4-year-old and 9-year-old boys seeing low-nutrition commercials did significantly increase their consumption of the low-nutrition foods but that girls were not affected. The pro-nutrition commercials had no apparent effect. Regardless of advertisement type, age did not mediate the effects of the commercials, and the self-report and behavioral measures correlated with one another in a low and inconsistent manner. Results are discussed with regard to methodological issues, developmental issues, and social policy implications. (Author/MP)

How Television Commercials Affect Children's Attitudes and Eating Behavior*

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Running head: Children's Television Commercials

*Paper presented at the meeting of the American Psychological Association, Montreal, September 1980. Preliminary draft; do not quote without written permission.

Footnote

This study was supported in part by the following research grants awarded to D. Balfour Jeffrey, principal investigator: The University of Montana Research Advisory Council, Grant No. 729-46, and the United States Department of Agriculture, Grant No. 5901-0410-8-0070-0 from the Competitive Research Grants Office. Special thanks are extended to Philip H. Bornstein and Donald P. Hartmann, who served as consultants to the research project; to James A. Walsh, who provided advice on the statistical analyses; to Steve Mills, who provided invaluable assistance on the computer analyses; to John Burrows, Signe Matson, Mary Rodgers, Scott Scanlon and Dennis Woody, who provided excellent help in the data collection and coding; to the University of Montana Preschool, Associated Students of the University of Montana Preschool, Head Start Preschools, and Prescott Elementary School, who all opened their doors so we could work with their children and staff; and to all the children and parents who participated in this study.

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Abstract

The present study examined the effects of various kinds of commercials on children's actual food consumption. Two age groups were used for a total of 96 boys and girls. That is, there were 48 four-year-old children (mean age = 4.65 years), and there were 48 nine-year-old children (mean age = 9.78 years). In both age groups there was an equal number of boys and girls. The variable investigated was type of advertisement (i.e., low-nutritional, pro-nutritional, non-food control), and the effects of the ads were assessed via a behavioral eating test, a food attitude scale, and an interview. Results tended to suggest that both four-year-old and nine-year-old boys seeing low-nutrition commercials did significantly increase their consumption of the low-nutrition foods but that girls were not affected. The pro-nutrition commercials had no apparent effect. Regardless of ad type, age did not mediate the effects of the commercials; and the self-report and behavioral measures correlated with one another in a low and inconsistent manner. These results were discussed with regards to methodological issues, developmental issues, and social policy implications.

How Television Commercials Affect Children's Attitudes and Eating Behavior

Television's potential impact has become a topic of debate and great concern. For example, empirical research has been summarized by Cisin, Coffin, Janis, Klapper, Mendelsohn, Omwake, Pinderhughes, Pool, Siegel, Wallace, Watson, and Wiebe (1972); advocacy groups such as Action for Children's Television have been formed; and the Federal Trade Commission has held hearings on the effects of television advertising. However, the concern about the influence has not been merely a recent development. That is, it was noted in the National Science Foundation Conference Report (1975) that the public was becoming concerned about the impact of television and advertising on children as early as 1955.

The concern about the potential influence of television seems justified in light of the data which suggest that 96% (Lesser, 1974) to 98% (Nielsen, 1978) of all Americans have at least one television set in their homes and in light of the data which have shown that children under age seven watch 60 hours of television per month and eight to 11 year olds watch 83 hours (Greenberg, 1976). More recently, Nielsen (1978) stated that the average child watches 25 hours of TV per week. By the time a person is 18 years old, then, he/she has watched approximately 15,000 hours of television, which makes it the most frequently engaged in activity other than sleeping (New York State Assembly, 1977). Furthermore, Barcus (Note 1) estimated that one out of every five hours is spent watching commercials; stated differently, the average child sees between 20,000 and 22,000 commercials per year (Choate, 1976). It also has been estimated that 66% of all commercials that were aired during children's hours were for food-related products, and two-thirds of all food ads were for sugar-added products (New York State Assembly, 1977). Less than seven percent of all food ads during the weekend were for nutritional foods and only two percent of all food ads during the weekdays were for nutritional foods such as dairy products, fruits, and breads (Barcus & Wolkin, 1977).

Another area of great interest has been the eating habits of Americans (New York State Assembly, 1977; U. S. Senate Select Committee on Nutrition and Human Needs, 1977). Such research efforts have found that the diets of many Americans are rich in saturated fats, cholesterol, sugar, and salt. For example, the New York State Assembly (1977) stated that the national average for sucrose consumption was 47.3 kilograms and that children consumed as much as 20% more sugar than the national norm. Finally, the New York State Assembly (1977) noted that over the past 20 years the consumption of dairy products, fruits, and vegetables has decreased 21% to 25% while the consumption of desserts, soft drinks, and snacks has increased 70% to 85%.

A legitimate question to ask is whether there are health risks associated with such increased use of high-sugar, low-nutritional foods. Numerous

investigators (e.g., Armstrong, 1951; Federation of American Societies for Experimental Biology, 1976; Mayer, 1968; U. S. Senate Select Committee, 1977; Yudkin, 1977) have reported that indeed there is a relationship between the consumption of low-nutritional, high-sugar foods and several degenerative diseases (e.g., tooth decay, obesity, arteriosclerosis, heart disease). Therefore, it appears that the propensity of the American people to eat foods with a high-sugar, high-fat content is correlated with some very serious health hazards. Consequently, the American Health Foundation, American Heart Association, Royal College of Physicians and British Cardiac Society, and the Senate Select Committee on Nutrition have recommended that people reduce their sugar consumption (Ratner, Hellegers, Stern, Ogg, Adair, & Zacharias, 1978).

The question which remains to be answered is whether there is a relationship between television advertising which predominantly promotes sugar-added products and the consumption of those foods. The data collected to date have suggested that television advertising does affect the behavior of the viewers. Longstreet and Orme (1967) and Lyle and Hoffman (1976) reported that children did attempt to influence their parents to buy the products (both toys and foods) which were advertised on television. Not only did 70% of the children try to influence parental purchases, but in the Longstreet and Orme (1967) study 89% of the parents did buy the items which were requested. Galst and White (1976) did a similar study; they found that the children who worked harder to maintain commercials on a monitor and who watched the most television at home were the ones who made a greater number of purchase-influencing attempts in the supermarket. However, because of a methodological weakness in the Galst and White study (1976), the results need to be interpreted cautiously.

Other investigators have relied entirely on questionnaire data to assess the relationship between advertising and consumptive behavior. For example, Ward and Wackman (1972) found that food products which were advertised heavily (e.g., breakfast cereals, snacks, candy, soft drinks) were requested by children in every age group. In addition, Sharaga (1974) found a relationship between the amount of television a child watched, food preferences, and nutritional knowledge. That is, children who watched more television reported eating more highly sugared cereals and snacks, and they possessed poorer nutritional knowledge and information. Ferguson's (1975) findings generally were supportive of Sharaga (1974) and Ward and Wackman (1972); his results indicated that food and gum commercials were recalled most frequently and that these same categories of advertisements were the best liked.

Goldberg, Gorn, and Gibson (1978) and Lemnitzer, Jeffrey, Hess, Hickey, and Stroud (Note 3) have employed needed experimental designs and have used some of the most sophisticated behavioral measures to further clarify the effects of low-nutritional and pro-nutritional ads. Goldberg, et al. (1978) found that exposure to either pro-nutritional or low-nutritional ads affected verbalized food preference. Subjects who viewed low-nutritional ads expressed a preference for more highly-sugared foods, and those who saw pro-nutritional

ads selected more fruits and vegetables. Lemnitzer, et al. (Note 3) found that only the low-nutritional group seemed to increase its actual consumption of foods on a behavioral eating test; the pro-nutritional group did not increase its consumption.

Clearly, the above two experimental studies (Goldberg, et al., 1978; Lemnitzer, et al., Note 3) suggest that television advertisements can affect the behavior of the viewers. Moreover, many of the early correlational studies suggested that there was a relationship between advertising and the viewers' consumptive behavior. However, since there are so few experimental studies, there is a need for more experimental studies to determine more clearly the influence of advertising on behavior.

Another question of importance is whether the effects of advertising are mediated by cognitive development. Social learning theory (Bandura, 1971) would suggest that advertisements might affect consumptive behavior regardless of cognitive level, whereas Piagetian cognitive theory probably would predict that, as one matures cognitively, he/she would become less susceptible to advertising influences. Since most studies have used only young children (i.e., four- and five-year-olds), it seemed necessary to compare children of different cognitive levels in order to see if the effects of ads were mediated by cognitive development.

A final question concerns the role television advertising may have on actual food consumption in addition to the effects it has on self-reports, cognitive recall, or reported intentions to buy some product. It seems important to establish cumulative data based on different measures and different designs. The early literature provided an important start with its reliance on self-report, survey, correlational studies. However, the results of these early studies are only suggestive of the effects of television advertising, and they should be considered tentative since some of the studies were characterized by methodological problems and limitations. Consequently, it is now time to include more experimental studies with direct measures of actual food consumption (National Science Foundation, 1977; Rychtarik, Jeffrey, & Kniivila, Note 5).

Therefore, an experimental study employing a direct measure of food consumption was undertaken to clarify the effects of television advertising. The study was concerned with the relative effects of low-nutritional, pro-nutritional, and toy ads on children's eating behavior and on their attitudes about the foods. The study was done with nine- to 10-year-old children (concrete operators) and with four- to five-year-old children (preoperational children). The two age groups were selected in order to determine if cognitive level had a moderating effect on the advertisements.

In line with the findings of Lemnitzer, et al. (Note 3), Goldberg, et al. (1978), and general social learning theory (Bandura, 1971), it was hypothesized that the children in the low-nutritional group would increase significantly their consumption of the foods and beverages on the behavioral eating

test, and in particular it was predicted that these children would increase significantly their consumption of the low-nutritional foods and beverages. Likewise, it was predicted that the children in the pro-nutritional condition would increase their consumption of the pro-nutritional foods and beverages on the behavioral eating test. However, the latter prediction was made with less confidence since the findings concerning the effects of pro-nutritional food advertisements are more equivocal. The subjects in the control group were not expected to increase significantly their consumption of the foods and beverages on the behavioral eating test. Since the findings with respect to the food attitude scale have been very inconsistent (Lemnitzer, et al., Note 3; Jeffrey, Lemnitzer, Hickey, Hess, McLellarn, & Stroud, 1980), no specific hypotheses were formulated regarding the effects of the advertising on children's attitudes. Finally, the predictions concerning age differences followed those one would expect if a social learning position were adopted. That is, it was hypothesized that there would be no differential effects of the advertisements on the two age (i.e., cognitive) groups.

Method

Subjects

Two different age groups (i.e., nine and four years) of children served as subjects in the study. The 48 nine- to 10-year-old subjects came from a fourth grade class in an elementary school in Missoula, Montana; the mean age was 9.78 years. There were 16 children in each of the three advertisement conditions; moreover, within each of the three advertisement conditions there was an equal number of boys and girls (i.e., eight of each sex). The 48 four- to five-year-old children came from a number of different preschools in Missoula, Montana; their mean age was 4.65 years. As with the older subjects, there were 16 children (eight boys and eight girls) within each of the three advertisement conditions.

Before any of the children participated in the experiment, permission was obtained from the Human Subjects Research Committee at the University of Montana, the administrators at the children's respective schools, and the children's parents. In addition, the children themselves were given the opportunity to decline participation or to discontinue their participation at any time. Two children refused to participate in the study, and one child did not want to return for the posttest.

Design

A pretest-posttest control group design (Campbell and Stanley, 1963) was used in the study. There were three advertisement conditions (i.e., low-nutritional, pro-nutritional, non-food control). Subjects were assigned randomly to experimental conditions. The dependent measures were a behavioral eating test (BET), a food attitude scale (FAS), and an interview; all measures were administered one week prior to the experimental manipulation and immediately after the experimental manipulation.

Procedure

All subjects were run in one of two identical rooms in a mobile research laboratory which was parked next to the school. As mentioned previously, there were two phases to the study; there was a pretest which was followed one week later by a posttest. The day before the pretest began at each school the experimenter and his assistants went to the school to meet the children, to show them the trailer, and to describe briefly what they would be doing. The purpose of that brief familiarization session was to make them feel more comfortable during the subsequent two experimental sessions.

Pretest. Each subject was tested individually. After being told that the study was an attempt to find out what children liked to eat, the subject was administered the BET. The experimenter left the room while the subject was tasting the foods, but he/she was observed unobtrusively through a one-way mirror to guard against procedural confounding (e.g., spillage, hoarding). After the BET was concluded, the experimenter returned to administer the FAS and a questionnaire.

Posttest. One week after the pretest each subject returned to the laboratory for the posttest at approximately the same time as he/she had been administered the pretest. The subject was told that the experimenter was running late and that he/she could watch television (i.e., the experimental manipulation) until the experimenter returned. After the television segment was completed, the experimenter again administered the BET, FAS, and another questionnaire following the same procedures used during the pretest.

Dependent Measures

The behavioral eating test, food attitude scale, and the pre- and post-interviews were the three dependent measures.

Behavioral Eating Test. The experimenter presented a tray of foods and beverages to the child. The tray included Hershey bars, Fritos, Chips Ahoy cookies, Froot Loops, Pepsi, cherry Kool-Aid, cheese, carrots, grapes, apples, milk, and orange juice; these foods and beverages were presented in individual clear plastic glasses which were arranged randomly on a plexiglas serving tray. In front of the glasses were pictures of the foods in their respective brand wrappings or natural states to help the children correctly identify the foods. The child had eight minutes during which he/she could eat as much as he/she wanted of anything on the tray; consumption was measured in grams and milliliters by subtracting the measurements before and after the child sampled the foods. The test was administered approximately two hours after the child's last meal to control for hunger. The detailed procedures for the BET and the FAS are published elsewhere (Jeffrey, et al., 1980).

As was mentioned previously, grams of food consumed were determined by measuring on a gram scale the weight of the food before the BET and then subtracting the weight of the remaining food after the BET. Likewise, the

volume of beverages consumed was calculated by measuring the milliliters in each glass before and after the BET; a graduated cylinder was used to make these measurements. All experimental assistants were trained in the use of the scale and the graduated cylinder, and reliability checks were performed to ensure interrater consistency. Interrater agreement was assessed by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Agreements were defined as any measurements within $\pm$ one gram or $\pm$ two milliliters; two observers' measurements were scored as a disagreement if they differed by more than the accepted values. Reliability checks prior to beginning the experiment yielded a mean rate of agreement of 98.7% with a range of 92% to 100%. Reliability checks also were done between assistants on the average on every 3.3 subjects; the mean rate of agreement on these checks was 99.6% with a range of 91% to 100%.

Food Attitude Scale. After the BET, the subject was asked to rate how much each food on the BET was liked and how much he/she would eat if he/she could have as much as was wanted. The child was asked to respond by pointing to one of four evaluative faces (ranging from smiling to frowning) and a corresponding cup (ranging from empty to full). These faces and cups were arranged on a plastic laminated poster. To enhance identification with the faces on the poster, the subject saw faces which were the same sex as he/she was. Food attitude scale scores ranged from one (indicating the food was not liked at all) to four (indicating the food was liked a great deal) for each food and beverage.

Pre- and Post-Interviews. The experimenter used the pre-interview to gather information about the child's eating patterns at home, his/her knowledge of good nutrition, and his/her cognitive level. The post-interview was used to assess the child's recall of the ads seen during the television program, his/her awareness of the differences between and functions of programs and commercials, and his/her television viewing habits. Both interviews were similar to those which have been used by Ward, Wackman, and Wartella (1977), Lemnitzer, et al. (Note 3), and Jeffrey, et al. (1980).

Experimental Manipulation

The kind of advertising seen was the independent variable. A Sony color videotape recorder and monitor were used to play back the video cassette. The subjects in the low-nutritional condition saw two different ads for Pepsi and two different ones for Froot Loops; subjects in the pro-nutritional condition saw two ads for carrots and two for milk; and the control children saw ads for Nerf footballs and basketballs, Slik Silver, and Bonkers. The ads were selected so as to be representative of what is seen typically by children on Saturday morning television and which were not biased sexually or more appealing to one age group over another. Each ad was 30 seconds long and was repeated at least twice. There was a total of five minutes of advertisements in all conditions, and these five minutes of ads were embedded within the same 7-minute and 50-second segment of typical children's Saturday morning programming (i.e., the Jetsons).

Since Ward and Wackman (1973) found a decrease in children's attention from programming to advertising, it was deemed important to obtain some independent assessment of how much the children were watching television. Thus, the experimenter observed each child through the one-way mirror while he/she was watching television and recorded the child's level of watching the television by using a standard five-second interval observation system. That is, it was noted whether the child was watching the television or not every five seconds. This observational procedure was used to allow a comparison of viewing time across programming and advertising and across advertisement conditions.

Assistants who were assigned the task of observing the children while they were watching television were trained in the use of the observational system, and percent agreement was calculated using the formula described in the section on food measurement. During training the mean interobserver rate of agreement was 95.9%, and the range was 92% to 100% agreement. In addition, reliability checks were performed on every 3.1 subjects during the actual experiment. These checks yielded a mean rate of agreement of 99.3% while the range was 97% to 100%.

Results

Analyses of Percent Time Watching TV

As noted above, the subjects were observed unobtrusively while they were watching television. These observations were performed in order to provide an independent assessment of whether the children were attending to the experimental manipulation and to determine whether their attention levels varied from the program to the commercials and from group to group. Therefore, the data were examined in terms of the total percent time watching television (programs + commercials), percent time watching commercials, and percent time watching programs.

The analyses of variance on total percent time watching TV, percent time watching commercials, and percent time watching programs did not reveal any significant differences between groups, sexes, ages, or their interactions ($p > .05$). The mean percent time watching TV for all groups was 98.25%; the mean time for watching commercials was 97.71%; and the average time watching programs was 98.67% (see Table 1). An analysis of variance also was done

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Insert Table 1 about here

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comparing the percent of time watching commercials and programs; again, there were no differences between groups, sexes, ages, or their interactions ($p > .05$). Thus, the children in the current study did watch the experimental manipulation, and their attention level remained consistently high across

programs and commercials.

Analyses of Test-Retest and FAS-BET Correlations

The effects of the experimental manipulations were assessed via analyses of the foods and beverages on the BET and FAS. The inital analyses of the individual foods and beverages on the BET were done on grams and milliliters since amount of food consumed was of interest. However, as in Jeffrey, et al. (1980), grams and milliliters were converted to calories; standard food value tables (e.g., Frederick, 1977; Netzer & Chaback, 1971) were used to make the conversions. Such conversions provided a measure more directly related to obesity and facilitated combining the data from both foods and beverages. The individual items on both the BET and FAS then were combined into 10 total score variables in order to reflect overall eating patterns and ratings and to enhance the psychometric properties of the measures (Jeffrey, et al., 1980; Jeffrey, et al., Note 2). That is, Jeffrey, et al. (1980; Note 2) found that the individual foods generally had standard deviations greater than the means and that the test-retest correlations were highly variable. Combining the individual items into the 10 total score variables did eliminate the problem of standard deviations being larger than the means, and the total scores were characterized by less variable and generally higher test-retest correlations than the individual foods and beverages. The 10 total score variables included the following: total calories foods and beverages, total calories food only, total calories beverages only, total calories low-nutrition foods and beverages, total calories pro-nutrition foods and beverages, total FAS, total FAS foods, total FAS beverages, total FAS low-nutrition foods and beverages, and total FAS pro-nutrition foods and beverages.

In order to get an estimate of the stability of the FAS and BET in the present study, correlation coefficients were calculated on the test-retest scores on the individual foods and beverages and the 10 total score variables. The mean coefficient on the individual FAS items was .46, and the mean coefficient on the total FAS variables was .64. On the other hand, the mean test-retest correlation on the individual BET items was .66, and the mean coefficient on the total BET variables was .80 (see Table 2). These results

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Insert Table 2 about here

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replicated the general findings of Lemnitzer, et al. (Note 3) and Jeffrey, et al. (1980; Note 2).

To assess the relationship between the FAS and BET on the pretest and the posttest, correlation coefficients also were calculated on the individual foods and beverages and total score variables. Inconsistent, low correlations were found for both specific foods (ranging from .111 to .365) and total score variables (ranging from .006 to .265) (see Table 3). These results

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Insert Table 3 about here

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also were consistent with those of Lemnitzer, et al. (Note 3) and Jeffrey, et al. (1980; Note 2).

It is readily apparent that the findings concerning the FAS consistently indicate that it is a problematic measure. That is, over the course of three previous studies (Jeffrey, et al., 1980; Jeffrey, et al., Note 2; Lemnitzer, et al., Note 3) and the current one, it has been found that the FAS has relatively low test-retest correlations and that the FAS does not correlate very highly with the 8ET. 8esides having poor psychometric properties, the results of the analyses of the FAS data were inconsistent and ambiguous, and they offered little information which was useful in explaining the behavioral data. Therefore, the results of the FAS data were excluded from any further presentation or discussion.

Analyses of Total Score Variables

Group by sex by age with repeated measures analyses of covariance were performed on each individual food and beverage on the 8ET, and the same analyses were done on the 10 total score variables. The analyses were done on a DEC-20 computer system using the BMDP-2V program which estimated the specific probability values. Analyses of covariance were done to try to minimize the effects of differences in consumption between bigger and smaller children which were observed by Lemnitzer, et al. (Note 3) and Jeffrey, et al. (1980). Therefore, height and weight were used as covariates since Jeffrey, et al. (1980; Note 2) found that both variables were correlated moderately with total calories consumed on the pretest and the posttest (range was .59 to .68).

One of the most consistent findings on the total calories variables was a significant sex X age interaction. The sex X age interaction was significant on three of the five total calories variables: foods and beverages, F (1,82) = 7.29, p = .008; beverages only, F (1,82) = 7.26, p = .009; and low-nutrition foods and beverages, F (1,82) = 5.75, p = .019. Post hoc comparisons (i.e., Newman-Keuls) revealed an identical pattern of differences between adjusted means on the foods and beverages variable and the beverages only variable. That is, there was no difference in consumption between the four-year-old boys and girls and the nine-year-old girls, but the nine-year-old boys ate significantly more food ($p < .05$) than did the four-year-old children and the nine-year-old girls. With respect to the low-nutrition foods and beverages variable, the Newman-Keuls indicated that there was no difference in consumption between the four-year-old boys and girls and the nine-year-old boys, but the nine-year-old girls ate significantly less food ($p < .05$) than did the other three groups. Although the sex X age interaction was not significant on the food only variable, there was a significant sex effect, F (1,82) = 4.85, p = .030; boys ate significantly more food than

the girls did. There was no significant sex effect on the pro-nutrition foods and beverages variable, and in fact, there were no significant main effects or interactions whatsoever on the total calories pro-nutrition foods and beverages variable ($p > .05$).

Another important significant effect was the change X group X sex interaction on the total calories foods and beverages variable, $F(2,84) = 3.60$, $p = .032$ (see Figure 1). The Newman-Keuls test which was done on the adjusted

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Insert Figure 1 about here

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means (see Table 4) indicated that the low-nutritional male condition was the

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Insert Table 4 about here

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only one which actually displayed a significant increase in consumption ($p < .05$). Moreover, the low-nutrition males did not differ from the pro-nutrition and control males on the pretest, but the low-nutrition males did consume significantly more food on the posttest than did the pro-nutrition and control males ($p < .05$). A similar finding was observed on the low-nutrition foods and beverages variable. Although the change X group X sex interaction was not significant at the traditional .05 level, it was close enough to be of interest, $F(2,84) = 2.75$, $p = .070$ (see Figure 2). As was the case with

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Insert Figure 2 about here

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the total calories foods and beverages variable, the post hoc comparisons done on the adjusted means (see Table 4) showed that the low-nutritional male group was the only one to increase significantly ($p < .05$) its consumption of low-nutrition foods and beverages. Furthermore, the low-nutrition, pro-nutrition, and control males did not differ on the pretest, but the low-nutrition males consumed significantly more food than did the latter two groups on the posttest ($p < .05$).

Analyses of Individual Foods and Beverages

In general, the findings of the analyses of the individual foods and beverages on the BET were very inconsistent. One factor which could have contributed to the problem was that the standard deviations of the items on the BET were larger than the means (in 67 out of 72 cases) which replicated

Jeffrey, et al. (1980) and Lemnitzer, et al. (Note 3). However, regardless of the cause, there were no discernible patterns in the analyses of the individual foods and beverages on the BET.

For example, there were no significant effects for Froot Loops on the BET, but the analysis of the amount of Pepsi consumed during the BET indicated that there was a significant change X group X sex X age interaction, F (2,84) = 3.03, p = .053. A closer inspection of that interaction's adjusted means via the Newman-Keuls test indicated that there were no significant increases in consumption from the pretest to the posttest for any of the groups.

The results of the analyses of the pro-nutritional foods and beverages were also somewhat confusing and inconsistent. For example, there were no significant effects revealed in the analysis of the amount of carrots consumed. On the milk-BET analysis, however, there was a significant sex X age interaction, F (1,82) = 5.83, p = .018. It was found through the post hoc tests that four-year-old boys and girls and nine-year-old girls did not differ in consumption, but nine-year-old boys drank significantly more than the other three groups ($p < .05$).

Analyses of Interview Items

The interview items were analyzed by treatment groups collapsed across sex and age, by sex collapsed across group and age, and by age collapsed across group and sex; a chi-square analysis was done on each item. The results indicated that there were very few differences between treatment groups on the interview items, no differences between males and females on the interview items, and many very interesting and important differences between four- and nine-year-old children's responses to the items.

There were no significant differences between treatment groups on most items. For example, the treatment conditions did not differ in their awareness of what constitutes a balanced diet, their ability to define programs and commercials, their belief in the truthfulness of programs and commercials, or in their cognitive abilities ($p > .05$). Moreover, there did not seem to be any differences between the treatment groups in terms of their recall of the advertised items ($p > .05$); of particular interest in this regard were the findings that 71.9% of the low-nutrition subjects recalled Pepsi and 78.2% recalled Froot Loops, while 59.4% of the pro-nutrition subjects recalled milk and 56.2% recalled carrots. As one might guess, though, significantly more low- and pro-nutrition subjects than control subjects reported seeing foods on television which were on the tray, χ^2 (2) = 62.85, $p < .0001$. In addition, more low- and pro-nutrition subjects than control subjects stated that the commercials made them want to eat the foods, χ^2 (2) = 10.89, p = .0043.

As noted above, there were no differences between boys' and girls' answers to the interviews ($p > .05$), but there were many significant differences between the four- and nine-year-old children. For example, it appeared

that significantly more nine-year-olds (39.58%) than four-year-olds (2.08%) could give a reasonably accurate definition of what a balanced diet is, χ^2 (3) = 29.97, $p < .0001$. Moreover, nine-year-olds seemed to be significantly more accurate than four-year-olds (93.63% vs. 60.19%, respectively) in identifying healthy and unhealthy foods, χ^2 (13) = 64.23, $p < .0001$. Such results were not surprising in light of the data which indicated, as expected, that the nine-year-olds were cognitively superior to the four-year-olds. The three open-ended questions used by Ward, et al. (1977) to assess an important component of cognitive development (i.e., perceptual boundedness or the ability to think in perceptual or abstract terms) were employed in the current study. These questions involved asking the children to differentiate between a house and a school, a car and a truck, and a mother and a father. The subjects' answers were scored according to the system described by Ward, et al. (1977). On each of the three items, then, the nine-year-olds showed a significantly greater tendency to answer in more abstract terms than did the four-year-old children (χ^2 (4) = 53.58, $p < .0001$; χ^2 (4) = 26.03, $p < .0001$; χ^2 (4) = 23.92, $p < .0001$, respectively). That is, it was found that the majority of four-year-olds (93.7%-97.9%) gave wrong answers or answers emphasizing physical differences to each item, and more nine-year-olds (22.9%-75%) gave answers to each item which emphasized activity or functional differences between the objects.

The nine-year-olds also seemed more able than the four-year-olds to recall by name the items which were advertised even though the two age groups did not differ when asked if they saw any foods on TV which were on the tray. Specifically, the nine-year-old children appeared to be better than the four-year-old children at recalling Pepsi, milk, basketball (χ^2 (5) = 44.05, $p < .0001$), Froot Loops, carrots, football (χ^2 (4) = 44.59, $p < .0001$), and Bonkers (χ^2 (3) = 8.49, $p = .0369$). Another important age difference was revealed when the subjects were asked to distinguish between and define commercials and programs. Significantly more nine-year-olds than four-year-olds had a good idea of the difference between ads and programs (χ^2 (3) = 55.8, $p < .0001$) and were better able to tell the functions of programs (χ^2 (4) = 47.36, $p < .0001$) and commercials (χ^2 (4) = 76.15, $p < .0001$). Finally, the results suggested that significantly more four-year-olds than nine-year-olds (62.5% vs. 0.000%) believe that programs always tell the truth, χ^2 (1) = 42.46, $p < .0001$, and that commercials always tell the truth (70.83% vs. 20.83%), χ^2 (2) = 25.32, $p < .0001$.

Discussion

Clearly, the low-nutrition boys did increase significantly their consumption of total calories foods and beverages after watching the television program, and they also consumed significantly more total calories of low-nutrition foods and beverages on the posttest than on the pretest. In addition to the behavioral effects, there were also some very important cognitive effects which were revealed through the interview data. That is, it was apparent that the boys in the low-nutrition condition watched the commercials at a very high rate, and they appeared to register the material since most of the boys were able to recall what products were advertised. Moreover, the

low-nutrition males reported seeing foods on television which were on the tray, and significantly more low-nutrition subjects than control subjects stated that the commercials made them want to eat the foods. These findings do seem to be consistent with other behavioral/experimental and survey/correlational studies (e.g., Galst & White, 1976; Goldberg, et al., 1978; Lemnitzer, et al., Note 3; Sharaga, 1974) which suggest that low-nutrition advertising does increase the recall, purchase, or consumption of the products. Specifically, the interview and behavioral data from the current study suggest that low-nutrition advertising does affect both the cognitive and consumptive responses of the viewers.

The above findings fit very nicely into the social learning theory model described by Bandura (1971). That is, there was evidence to suggest that the low-nutrition males did go through each of the four steps in the acquisition of a modeled behavior. Attention (i.e., focusing on the modeled stimuli) was demonstrated by their very high viewing rates; retention (i.e., storing the information in memory) was revealed by the subjects' recall of the ads. Motor reproduction (i.e., the actual verbal or physical imitative response) was apparent in the boys' statements that the ads made them want to eat the foods and in their actual consumption of the foods. At this point, however, one can only speculate about the motivational processes (i.e., reinforcements or incentives to perform the modeled response), but they do seem to be in operation since the ads imply that one will be popular, successful, or enjoy good health if the products are eaten. Therefore, Bandura's social learning theory (1971) does seem to account for how television advertising affects the behavior of these viewers.

Despite the intriguing nature of the above results and their ties with social learning theory, one must be cautious and not over-state the implications of the findings for two reasons. First, caution is urged because the effects of the advertising were observed only on total calories foods and beverages and total calories low-nutrition foods and beverages; there were no corresponding effects on the consumption of the specifically advertised food and beverage. The second reason that one must be careful in interpreting the results is that there was a lack of significant increases in consumption by low-nutrition females; this point will be discussed later.

The lack of an effect on the individual items could have been due to the high variability of the individual foods and beverages or to the brief exposure to the ads. Both issues can be studied experimentally. That is, further refinements of the BET can be done to try to reduce the variability of the individual items, and one also can vary the exposure levels over a period of time to see if there are differential effects. Despite this limitation, one must keep in mind that general eating patterns are of primary importance and that the consumption of any single item is secondary. Since that is the case and since the total score variables do provide a reasonably good picture of general eating patterns, there is still evidence which suggests that low-nutrition advertisements can lead to a significant increase in consumption of low-nutrition foods and beverages.

A second major finding was that age did not mediate the effects of the ads. Specifically, the four- and nine-year-old male subjects in the low-nutrition condition were not affected differently by the ads. There was no difference in the effects of the ads on the consumption of the two age groups despite the findings which suggested that nine-year-olds in comparison to four-year-olds were more aware of a balanced diet, more cognitively sophisticated, more able to distinguish between programs and commercials, more aware of the intentions of commercials, and more distrustful of ads.

The possible implications of the finding that ads appear to be capable of influencing behavior even though one is cognitively sophisticated and distrustful and aware of the intentions of ads are rather staggering. Cognitive oriented theorists and researchers (e.g., Ratner, et al., 1978; Roberts, Bachen, Christenson, & Gibson, Note 4) have suggested that as children become cognitively more sophisticated and distrustful of ads that they are more able to defend against the persuasiveness of commercials. Unquestionably, children do become more sophisticated cognitively as they get older. Piaget (1970) summarized many of the changes which occur during early and middle childhood. That is, children under age seven or eight are primarily in the stage of pre-operational thought; such children are egocentric, syncretic, and dominated by their immediate perceptions. On the other hand, children over age eight become capable of concrete operational thought; in other words, older children have overcome their egocentrism and syncretism, are able to conserve, and can manipulate the elements of perception which enables them to begin to think logically. Therefore, one would expect that as one matures cognitively, that he/she would be better able to distinguish between ads and commercials, be more aware of the purpose of ads, and be more critical and distrustful of ads. The current study and previous work by Ward (1972; 1974) and Ward, et al. (1977) have demonstrated that older, more cognitively sophisticated children are more aware of the intentions of ads and more distrustful of them than are younger children. However, in contrast to the position of Ratner, et al. (1978) and Roberts, et al. (Note 4), the current study did not find that these skills enabled the nine-year-old children to defend against the ads better than the four-year-old children; as noted previously, both four- and nine-year-old boys increased their consumption significantly. Cognitive-communication theorists would seem to have difficulty explaining this finding.

Social learning theorists (e.g., Bandura, 1971), on the other hand, probably would have little difficulty explaining the finding that younger and older boys in the low-nutrition condition were influenced in a similar way by advertisements in spite of the differences in cognitive level. Although modeling effects depend on the interactions of variables such as model characteristics, number of models, and the consequences the model receives, there has been no mention that cognitive development mitigates modeling effects (Akamatsu & Thelen, 1974). Therefore, social learning theorists would have predicted that modeling would occur across cognitive developmental levels.

It is apparent, then, that a policy to regulate advertising directed at children which is based on the assumption that cognitive development enhances

an older child's (or even an adult's) defenses against the influence of ads may be inappropriate. Low-nutrition ads appear to be capable of influencing behavior even though one is cognitively mature, distrustful of ads and aware of their functions. Since children and adults see so many commercials each year, they would seem to be a very potent factor in one's behavior despite one's cognitive level. However, there is still a need for more empirical demonstrations of the behavioral effects of low-nutrition ads on a wider range of age groups.

The pro-nutritional ads did not affect the behavior of the children who watched them. In other words, there were no changes in consumption by the pro-nutritional group which lends some support to the same finding by Lemnitzer, et al. (Note 3). Both of these sets of findings, however, are different from those of Goldberg, et al. (1978) who found that pro-nutritional ads did change the preferences of subjects who saw them. These contradictory findings probably cannot be explained on the basis of differences in the amount of exposure to pro-nutrition ads since Goldberg, et al. (1978) had 4.5 minutes of ads in one condition and the present experimenters had 5.0 minutes of ads. A possible explanation is that the differences are due to comparing questionnaire data with actual food consumption data; that explanation becomes more plausible in light of the consistently low correlations between the FAS and BET. Granted, Goldberg, et al. (1978) were not using the FAS; instead they used a pretend eating test which has not been correlated with actual consumption. Therefore, it seems that it is necessary to correlate their measure with one of actual consumption to determine the relationship which might exist and to see if that is the cause of the contradictory findings.

The lack of a significant effect of pro-nutritional commercials in the present study, however, does not seem to be due to a lack of attention since the subjects viewing those advertisements watched them 98.09% of the time; this level of attention was not different from the level of attention to the program (i.e., 98.81%). Moreover, the majority of the pro-nutritional subjects recalled the products which were advertised; such evidence suggested that they retained the information as well as attended to it. According to Bandura's (1971) social learning, then, the modeled behavior was not imitated either because the behavior was not in the observer's repertoire or because motives or incentives were not available. Obviously, the latter explanation is more probable. In other words, the pro-nutritional ads might not have been identified with; they might not have been repeated often enough; or the ads may not have been highly convincing or persuasible.

It is clear that the implications of the ineffectiveness of pro-nutritional commercials to produce a change in consumption are very important. That finding suggests that even some of the best pro-nutritional commercials which are on the air currently need to be improved if they are going to have an effect on children's eating behavior. Perhaps the producers of such commercials should try to employ more fully those social learning principles (e.g., multiple models, peer groups, catchy songs) which have been found to enhance vicarious learning and modeling. Another action might be to increase the

frequency of exposure to pro-nutritional commercials in an effort to offset the tremendous exposure that children have to low-nutritional commercials. Both of the above actions are amenable to experimental investigations, and both may be necessary before pro-nutritional commercials will produce consistent and significant changes in the consumption of pro-nutritional foods.

As noted previously, the statements about the effects of the low-nutritional ads must be tempered somewhat since there was no apparent effect of those commercials on the consumptive behavior of females. One might speculate that there was a sex difference in the ads which made them more appealing to boys rather than girls. However, the ads were selected so as to contain both males and females or to be asexual in order to try to control for differential identification with the ads. One also could posit that the girls did not watch the commercials as much or recall them as well as the boys did. Again, such an explanation does not seem completely satisfactory since there were no differences between boys and girls in their attention levels or recall ability. Finally, another possible reason could be that girls were more critical and distrustful of the ads and, hence, less susceptible to them than were the boys. Data are available which again tend to discount the latter hypothesis, girls were not more mistrustful of the ads than were the boys according to their responses to the interview item. At this point, the differential effects of the low-nutrition ads dependong on sex seem to be inexplicable. It is an issue which is in need of further investigation.

An important methodological issue concerns the viability of the FAS as a dependent measure. A series of three previous studies (Jeffrey, et al., 1980, Note 2; Lemnitzer, et al., Note 3) and the present experiment have found the FAS to correlate inconsistently and at a low level with the BET. Moreover, the test-retest correlations on the FAS are inconsistent and lower than the test-retest correlations on the BET. It would seem, therefore, that the FAS should be abandoned as a measure or at the very least modified drastically. Although it may be too much to expect self-report and behavioral measures to be correlated highly on a complex behavior such as eating, the implication is clear. That is, one should not use a self-report measure by itself unless it has been correlated empirically with actual consumption. Consequently, it is necessary to use consumptive measures to determine the effects of TV advertising on eating. The BET is one such measure, but it is not without its problems (i.e., large variability on the individual foods). However, the total score variables are more stable and reliable than the individual foods, and so they do present a clearer picture of general eating patterns. Clearly, though, the BET can be improved in subsequent investigations. Moreover, additional experimental studies with both self-report and behavioral measures are needed; these studies can manipulate variables such as amount of exposure, quality of the ads, and sex of the models and observers.

Overall, the conclusions which seem justified at this point are that males eat more than females particularly at age nine and that children do attend to both programs and commercials at a very high rate. In addition,

it was demonstrated that low-nutrition commercials have a significant effect on eating behavior; that is, viewing such commercials did lead to an increase in consumption of low-nutritional foods and beverages by males. Moreover, the ads did not have differential effects on the two age groups, and the low-nutritional ads did not affect the consumption of girls. The findings of the current study also indicated that brief exposure to pro-nutrition commercials has no effect on eating. Since the findings of the present study are not completely consistent, any attempts to generalize the findings must be done with caution. However, there does seem to be reason for concern about the nature of the advertising which children are primarily exposed to.

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Table 1

Means and Standard Deviations for TV Viewing

Total Percent TV (Ads + Programs)

	$\bar{x}$	SD
Low	97.41	3.81
Pro	98.50	1.88
Control	98.84	1.80
Male	98.21	2.50
Female	98.29	2.92
Four	98.19	2.25
Nine	98.31	3.12
All Groups	98.25	2.71

	Percent Commercials		Percent Program	
	$\bar{x}$	SD	$\bar{x}$	SD
Low	96.38	7.74	98.19	2.29
Pro	98.09	2.93	98.81	1.91
Control	98.66	2.18	99.00	2.02
Male	97.88	3.49	98.52	2.65
Female	97.54	6.17	98.81	1.97
Four	98.21	2.48	98.29	2.87
Nine	97.21	6.60	99.04	1.56
All Groups	97.71	4.99	98.67	2.33

Table 2

Test-Retest Correlations for BET and FAS

BET	r	FAS	r
Hershey	.762	Hershey	.341
Fritos	.636	Fritos	.470
Chips Ahoy	.631	Chips Ahoy	.490
Froot Loops	.585	Froot Loops	.456
Pepsi	.546	Pepsi	.366
Kool Aid	.487	Kool-Aid	.518
Cheese	.609	Cheese	.511
Carrots	.806	Carrots	.526
Grapes	.570	Grapes	.576
Apples	.849	Apples	.327
Milk	.741	Milk	.494
Orange Juice	.659	Orange Juice	.451
Total Calories	.867	Total Food Attitude Scale	.701
Total Calories Foods	.788	Total Food Attitude Scale Foods	.623
Total Calories Beverages	.754	Total Food Attitude Scale Beverages	.571
Total Calories Low-Nutrition Foods & Beverages	.805	Total Food Attitude Scale Low-Nutrition Foods & Beverages	.668
Total Calories Pro-Nutrition Foods & Beverages	.773	Total Food Attitude Scale Pro-Nutrition Foods & Beverages	.645

Table 3

FAS-BET Correlations on Pretest and Posttest

Pretest	r	Posttest	r
Hershey	.235	Hershey	.292
Fritos	.256	Fritos	.353
Chips Ahoy	.249	Chips Ahoy	.270
Froot Loops	.111	Froot Loops	.133
Pepsi	.322	Pepsi	.365
Kool Aid	.241	Kool-Aid	.187
Cheese	.272	Cheese	.352
Carrots	.258	Carrots	.246
Grapes	.111	Grapes	.242
Apples	.261	Apples	.247
Milk	.270	Milk	.288
Orange Juice	.360	Orange Juice	.245
Total FAS-Total Calories	.074	Total FAS-Total Calories	.055
Total FAS Foods-Total Calories Foods	.055	Total FAS Foods-Total Calories Foods	.006
Total FAS Beverages-Total Calories Beverages	.265	Total FAS Beverages-Total Calories Beverages	.251
Total FAS Low-nutrition--Total Calories Low-Nutrition Foods & Beverages	.195	Total FAS Low-Nutrition--Total Calories Low-Nutrition Foods & Beverages	.196
Total FAS Pro-nutrition--Total Calories Pro-nutrition Foods & Beverages	.058	Totas FAS Pro-nutrition--Total Calories Pro-nutrition Foods & Beverages	.191

Figure Caption

Figure 1. Trials X group X sex interaction: Adjusted means for total calories foods and beverages.

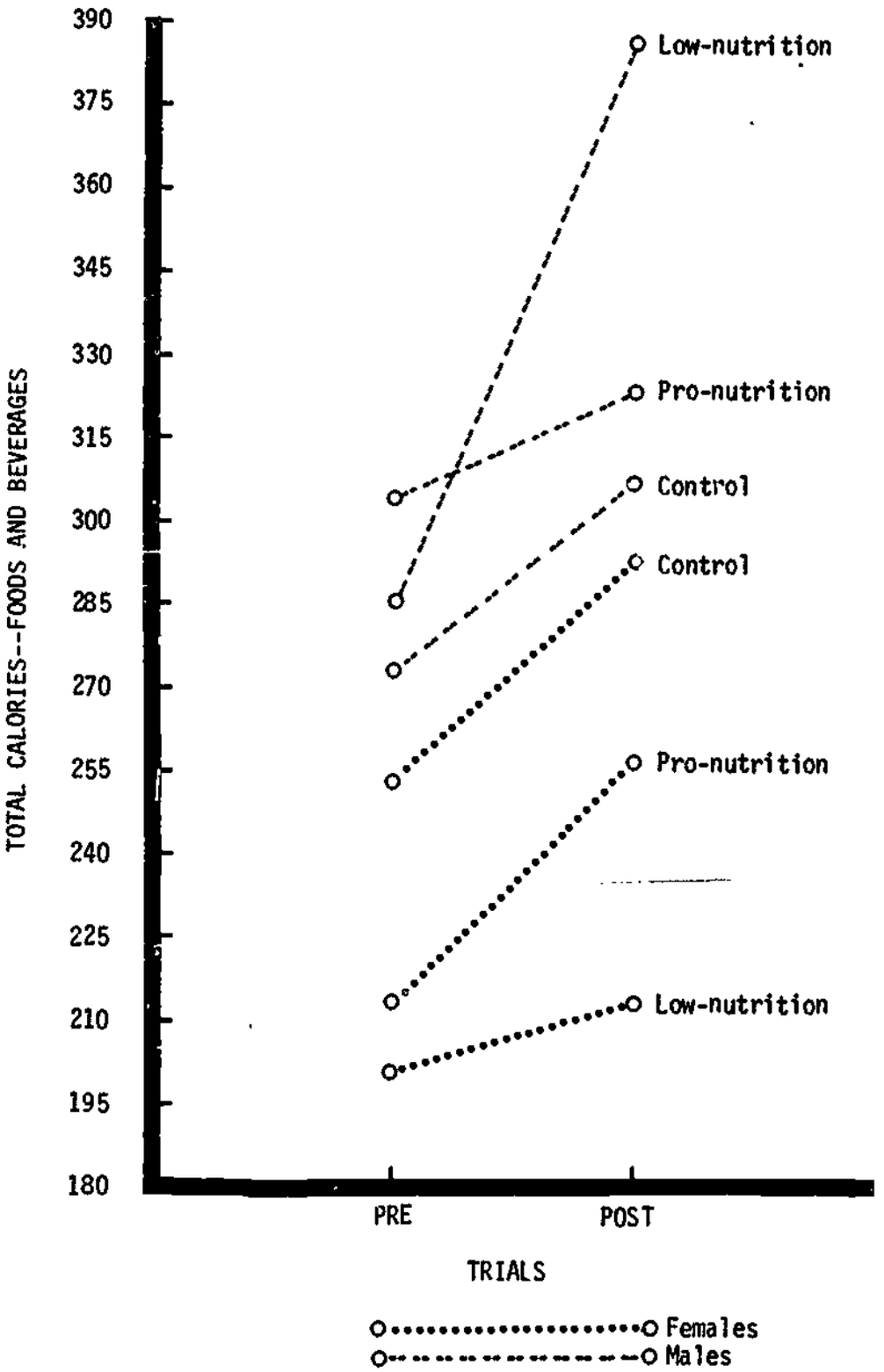

390
375
360
345
330
315
300
285
270
255
240
225
210
195
180
TOTAL CALORIES--FOODS AND BEVERAGES
Low-nutrition
Pro-nutrition
Control
Control
Pro-nutrition
Low-nutrition
PRE
POST
TRIALS
Females
Males

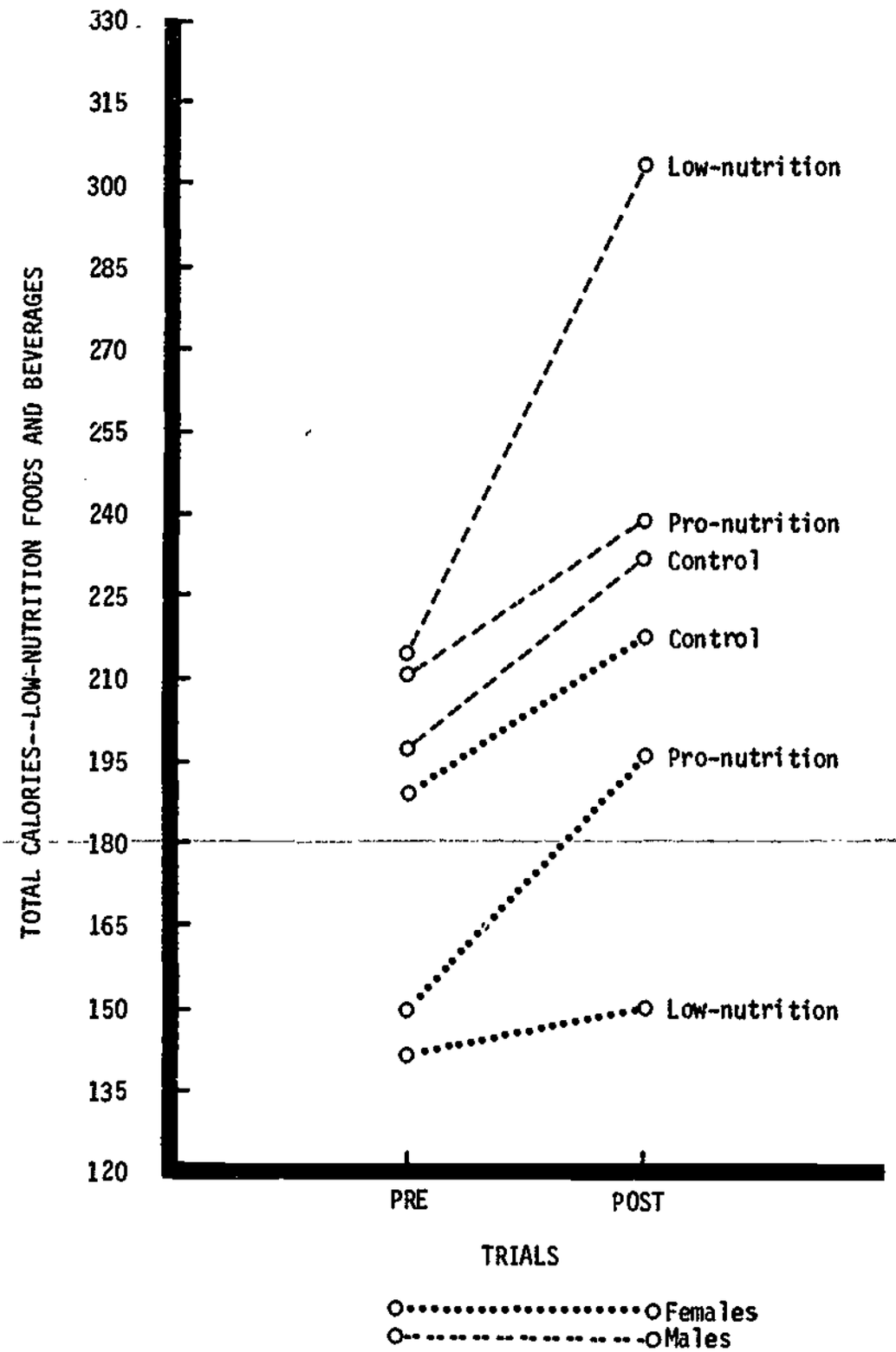
Table 4

Adjusted Means and Standard Deviations for
Change (Trials) X Group X Sex Interaction

		Pretest		Posttest	
		$\bar{x}$	SD	$\bar{x}$	SD
Total Calories Foods & Beverages	Low Male	285.94	229.92	386.21	227.16
	Low Female	201.13	121.09	213.16	107.39
	Pro Male	304.04	218.34	323.17	187.40
	Pro Female	213.25	91.42	257.15	117.55
	Control Male	272.91	191.15	307.51	229.61
	Control Female	253.15	146.03	293.22	131.41
Total Calories Low-Nutrition Foods & Beverages	Low Male	213.72	186.68	303.41	183.86
	Low Female	141.04	88.84	149.47	85.76
	Pro Male	210.95	164.74	238.51	152.86
	Pro Female	149.15	72.62	195.40	110.35
	Control Male	197.01	131.93	231.75	193.52
	Control Female	189.65	104.22	217.59	98.67

Figure Caption

Figure 2. Trials X group X sex interaction: Adjusted means for total calories low-nutrition foods and beverages.


330
315
300
285
270
255
240
225
210
195
180
165
150
135
120
TOTAL CALORIES--LOW-NUTRITION FOODS AND BEVERAGES
Low-nutrition
Pro-nutrition
Control
Control
Pro-nutrition
Low-nutrition
PRE
POST
TRIALS
Females
Males