ABSTRACT
The prevalence of overweight and obesity has risen dramatically over the past 2 decades. Among the many contributing factors is increased consumption of fast foods. Mass media outlets have cited the potential of the film Super Size Me to alter this behavior. The purpose of this study was to determine the effect of this film on young adults’ fast-food knowledge and psychosocial measures (ie, attitudes, self-efficacy, healthy weight locus of control, and stage of change) and evaluate the effectiveness of this film as a form of emotional arousal and consciousness-raising. A pretest-posttest follow-up control group design with random assignment was used. Young adults (n=135; 54% female) completed the pretest; approximately 10 days later viewed a film then completed the posttest; and about 9 days later completed the follow-up test. The experimental group (n=80) viewed Super Size Me. The control group (n=55) viewed an unrelated film. Unpaired t tests revealed that the study groups did not differ significantly (P>0.05) at pretest on any measure. Analysis of covariance, with pretest score as the covariate, revealed the experimental group scored substantially better than the control group at posttest on knowledge and nearly all psychosocial measures. In addition, the experimental group continued to score substantially higher than the control group at follow-up on knowledge, stage of change, and consciousness-raising and lower on external: chance health locus of control. Super Size Me represents a potentially powerful tool for nutrition education. Nutrition practitioners should consider using Super Size Me as a consciousness-raising and emotional arousal change process with patients in pre-action stages of change for reducing fast-food intake.

Perspectives in Practice
Knowledge and Psychosocial Effects of the Film Super Size Me on Young Adults
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The prevalence of obesity in the United States and worldwide has risen dramatically over the past 2 decades. Identification of the causes of this complex multifactorial disease has been as difficult as the disease is pervasive. Among the many contributing factors are increasing portion sizes and increased consumption of fast food (1). Larger portion sizes, coupled with the fact that most Americans underestimate portion sizes (2) and tend to eat more when portions are larger (3), results in consumption of excess calories (3), contributing to the obesity epidemic.

Just as portion sizes have increased over the past 15 to 20 years (4), so has the frequency of eating outside the home. The number of fast-food meals eaten per week is positively associated with total energy intake, percentage of energy from fat, and body mass index in women (5). Reducing or altering fast-food intake could result in improvement in weight status. Changing behaviors to promote weight management remains a challenging and elusive process. According to the Prochaska's Transtheoretical Model of Behavior Change, progressive behavior changes are facilitated by intervention methods known as change processes (6). Emotional arousal (also called dramatic release or catharsis) and consciousness-raising (increasing level of awareness and information available to individuals) are change processes that can assist individuals in making changes to improve their health.

Commercial films and television programs are forms of media that can increase knowledge of health issues, while simultaneously appealing to the emotions of viewers (7,8). An emotionally arousing and consciousness-raising film that may contribute to behavior change, Super Size Me (9), illustrates the detrimental effects of a diet consisting entirely of fast food. Following its release, Super Size Me received extensive press coverage because of its unique and somewhat shocking subject matter. Media sources (10-12) provided commentary on the film, some even citing its potential to alter eating behavior. USA Today reported that the film could “work . . . effectively to change minds and behavior” (13). This film, as a form of emotional arousal and consciousness-raising may be a vehicle for initiating changes, such as reducing fast-food intake, that help combat the problem of obesity. Thus, the purposes of this study were to examine the effects of the film Super Size Me on college students’ fast-food knowledge, attitudes, self-efficacy, healthy weight locus of control, and stage of change. A second purpose was to evaluate the film’s effectiveness as a form of emotional arousal and consciousness-raising for maintaining a healthy weight and following a healthful diet.

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METHODS
Sample
The sample was comprised of young adults (18 to 26 years) enrolled in an introductory psychology course at Rutgers University. In return for participation, participants received research points required by this course. College students were studied because they consume fast food frequently (14,15).

Research Design
A pretest-posttest follow-up control group design with random assignment was used (16). Both the experimental and control groups completed the pretest, posttest, and follow-up test. The pretest included all eight of the questionnaires described here. All questionnaires, except the demographic questionnaire, were completed again at the posttest and follow-up test. Participants completed the pretest online. An average of 10 days later, they participated in the intervention (ie, viewed a movie). The experimental group saw Super Size Me and the control group was shown either the movie Finding Neverland or First Daughter, neither of which was related to nutrition. Participants were blind to the movie that would be shown until they arrived at the showing. To assess short-term effects, immediately following the intervention, both groups completed the posttest in a pencil-and-paper format. An average of 9 days later, both groups participated in the online follow-up test administered to examine persisting effects of the film. This study was approved by the university’s Institutional Review Board.

Assignment to the experimental or control group was a three-step process. First, to keep the study purpose obscure, it was decided a priori that participants who had seen Super Size Me and/or read Fast Food Nation (17) prior to the study would be permitted to participate, but their data would be discarded. To avoid the possibility that they might inadvertently cue or bias the experimental group during the intervention, it was decided a priori that those that had seen Super Size Me and/or read Fast Food Nation (17) would be shown a control group movie. At the pretest, participants indicated which of six films (one of which was Super Size Me) they had seen, which of 10 books (one of which was Fast Food Nation (17)) they had read, and which time slots they were available to view a film. In the second step, the films were assigned to each of the 29 time slots available for showing the film. Film assignment was determined by the times participants that had seen Super Size Me and/or read Fast Food Nation (n=46) were available; that is, time slots selected by these participants were assigned a control film (15 showings) and the experimental film was assigned to all other time slots (14 showings). Third, those that had not seen Super Size Me and/or read Fast Food Nation (n=148) were assigned to the experimental or control group based on when they were available to see a film.

Instruments
The study included eight instruments. The rules of cognitive and psychosocial item construction (18-21) were rigorously followed in the development of these instruments. The item pool was reviewed by a panel of experts (n=10) in nutrition and/or tests and measurement for clarity, usefulness, and contextual value and being representative of the construct measured (ie, content validity) (20,22), then revised. Next, nutrition and health graduate students (n=5) completed the instruments to assess their readability, identify grammatical errors, and provide feedback with regard to appropriateness of questions and responses. Subsequently, all instruments, with the exception of one that was added after the pilot test (ie, consciousness-raising), were refined, pilot-tested with undergraduate students (n=69), and further refined. Lastly, all instruments were reviewed again by the panel of experts to establish content validity (20,22).

The first instrument collected demographic information (ie, age, sex, race/ethnicity, college major, number of college level nutrition courses completed, height, weight, personal weight satisfaction, personal and family history of obesity-related health conditions, recent movies seen, and books read). The second instrument assessed knowledge related to nutrition, fast food, and obesity-related health conditions and was based on factual information presented in the movie Super Size Me. Fast-food knowledge score was computed by awarding one-point for each correct answer and summing the total. This 31-item true/false questionnaire had a reliability coefficient of 0.85 (23).

The remaining instruments assessed psychosocial measures including attitudes, self-efficacy, locus of control, stage of change, emotional arousal, and consciousness-raising. The third instrument was a 16-item Likert-type attitude questionnaire with three constructs (scales): Perceived Personal Susceptibility to Obesity and Related Health Conditions, Feelings About the (Un)Healthfulness of Fast Food, and Personal Concern about Maintaining a Healthy Weight. Attitude scale items were constructed using previous research studies as a guide (24,25); however, little research has been done to develop, validate, and establish the unidimensionality of obesity-related attitudinal constructs. Thus, this instrument was developed almost entirely de novo. First, a series of Likert-type items with five response choices (ie, strongly agree, agree, uncertain, disagree, strongly disagree) were written for each construct and then reviewed by the expert panel, revised, and pilot-tested. Pilot-test data were subjected to principal components factor analysis (26) using an orthotran/varimax transformation method to refine the scales and establish the unidimensionality of the statements reflecting each construct. Finally, the expert panel reviewed the statements in each scale that remained after factor analysis to confirm their content validity. Statements from each scale were mixed throughout the instrument and some statements were worded negatively to prevent a response set. For each statement, a score of 5, 4, 3, 2, or 1 was assigned to strongly agree to strongly disagree, for positively worded statements. The scoring was reversed for negatively worded statements. An overall mean scale score was computed by summing item scores and dividing by the number of items in the scale. Thus, mean scale scores ranged from 5 to 1. Confirmatory factor analysis using data from study participants revealed each item had a high factor loading on it a priori, indicating construct validity (20,22), and verified the unidimensionality of each scale. Cronbach α reliability...
ity coefficients are .89, .78, and .89 for the scales in the sequence they are named above. The 19-item Likert-type self-efficacy instrument measured self-efficacy for reducing fast-food intake and was modified from previous measures (24,27-30). Scores for each item ranged from 5 (“I am sure I could do it”) to 1 (“I am sure I could not do it”). Total scale score was calculated by summing ratings for all items and dividing by the number of items in the scale. Thus, scores could range from 1 (low self-efficacy) to 5 (high self-efficacy). Cronbach α coefficient was .95.

The fifth instrument assessed nutritional locus of control, which is the degree to which an individual believes that following a nutritious diet and maintaining a healthy weight is controlled internally, by powerful others, and/or by chance (31). The format of the statements and scale assignment were derived from the Health Locus of Control Scale (32,33) and Weight Control Locus of Control Scale (34) and modified to reflect locus of control for maintaining a healthy weight. Like the instruments on which it was based (31-34), the locus of control instrument included three Likert-type scales (ie, internal, external: powerful others, and external: chance), each of which contained six items having the same five answer choices and scoring method as the attitude scales. Factor analysis procedures like those described above confirmed the unidimensionality and construct validity of the three scales. Cronbach α coefficients for internal, external: powerful others, and external: chance were .69, .55, and .58, respectively. Items from each scale were mixed throughout the Locus of Control section to prevent a response set.

The sixth instrument was a single item designed to assess participants’ stage of change (ie, precontemplation, contemplation, preparation, action, and maintenance) for reducing fast-food intake. The format of this item was similar to that used in previous studies (35,36). Specifically, the item asked participants if they consistently avoid or minimize high-fat fast-food intake. Those answering “no and don’t intend to in the next 6 months” were classified as precontemplators. Contemplators were those replying “no, but intend to in the next 6 months.” Preparers were those answering “no, but intend to in the next 30 days.” Replies of “yes, and have been for more than 30 days” were classified as being in the action stage. Maintainers were those that answered, “yes, and have been for more than 6 months.”

The last two instruments were Likert-type scales using the same response choices and scoring method as the attitude scales. The seventh instrument, a six-item Likert-type questionnaire, was slightly modified from a previously reported questionnaire (37) and had a Cronbach α coefficient of .81. The eighth instrument, an eight-item consciousness-raising questionnaire, was based on items utilized in two previous studies (37,38). Its Cronbach α coefficient was .85.

**Data Analysis**

Descriptive statistics were generated for demographic characteristics. Unpaired t-tests determined whether study groups differed on any pretest measure. Analyses of covariance (ANCOVA), with pretest score as the covariate, were conducted for each measure to determine if the experimental and control groups’ mean scores differed significantly (P<0.05) at the posttest and follow-up test. Data were analyzed using Statview (version 5, 2002, SAS Institute, Cary, NC).

**RESULTS**

A total of 194 individuals participated in the study; 135 remained after eliminating 12 that did not complete all study parts, one who was older than age 26 years, and 46 that had previously seen Super Size Me and/or had read Fast Food Nation (17). The final sample size was 135 participants, with the experimental group being larger (n=80 vs 55 for control) because of several factors, including a priori decisions regarding participation and group assignment of those who had seen Super Size Me and/or read Fast Food Nation, group assignment based on availability at the times films were to be shown, and attrition. Mean age was 19.3±0.06 standard error years (range 18 to 23 years). The majority were female (n=73; 54%) and white (n=71; 53%). Participants were from a wide variety of majors, with business being the most common (n=23; 17%). The majority (n=132; 98%) had not completed any college-level nutrition courses. The mean body mass index, 22.7±0.38, indicated the average participant was a healthy weight. Overall, participants were fairly satisfied with their body weight; only about 11% in both study groups reported they weighed a lot less or a lot more than they would like. Obesity-related health conditions were uncommon among participants. In contrast, these conditions were common among their immediate family members with the dominant problems being hypertension (n=64; 47%), high blood cholesterol (n=56; 41%), obesity-related cancers (n=34; 25%), type 2 diabetes (n=27; 20%), heart disease (n=25; 19%), and respiratory problems (n=21; 16%). Participants (n=25; 19%) reported that one or more individuals in their immediate families were obese.

Overall, the study groups had similar demographic characteristics, with the exception of race/ethnicity (ie, white vs nonwhite). The experimental group had significantly more whites than the control group (61% vs 40%; P=0.0149). Unpaired t-tests revealed that the study groups did not differ significantly on any measure at pretest. In addition, there were no significant differences on any measure between whites and nonwhites.

Knowledge test data revealed that at the pretest, participants in both study groups correctly answered about two thirds of the questions. ANCOVA, with mean pretest knowledge score as the covariate, indicated that the experimental groups’ mean posttest knowledge score was significantly greater (P<0.0001) than the control group, indicating that Super Size Me increased their knowledge (see Table). Furthermore, ANCOVA revealed that the experimental group’s mean follow-up knowledge score was significantly higher than that of the control group.

The Table also shows that both groups had positive attitudes at baseline. ANCOVA revealed that the groups did not differ at posttest or follow-up on the Perceived Personal Susceptibility to Obesity scale. However, the experimental group’s mean score for Feelings About the (Un)Healthfulness of Fast Food was significantly higher at the posttest, indicating that they believed fast food was less healthful immediately after seeing Super Size Me.
Although the groups differed substantially on this scale at the follow-up test, this difference appears to be due to a decrease in the control group’s mean score rather than a change in the experimental group’s mean score. The experimental group’s mean score on the Personal Concern about Maintaining a Healthy Weight scale was significantly higher than the control group at the posttest, indicating that they were more concerned about maintaining a healthful weight after seeing Super Size Me. This significant difference was not retained at follow-up test.

Both groups began the study with a high level of self-efficacy; that is, they were confident in their ability to control fast-food intake (3.82±0.62). At the posttest, results of ANCOVA revealed that after seeing Super Size Me, the experimental group scored significantly higher than the control group, a difference that was not evident at the follow-up test.

The experimental group scored significantly higher than the control group on the internal health locus of control scale at the posttest. No significant difference was found between these groups on the internal health locus of control measure at the follow-up test. The groups did not differ significantly on the external: powerful others locus of control scale at the posttest or follow-up test. In contrast, the experimental group scored significantly lower on the external: chance locus of control scale than the control group at both the posttest and follow-up tests.

The Table indicates that both study groups began the study in the preparation stage for reducing fast-food intake. ANCOVA indicates that the experimental group advanced to a significantly higher stage at the posttest than the control group. This significant difference was maintained at the follow-up test.

Mean emotional arousal posttest scores differed significantly; in specific, the experimental group’s posttest score was significantly higher than the control group’s mean score indicating the experimental group was more emotionally aroused after seeing Super Size Me than the control group. For the follow-up test, however, no significant difference was found.

Pretest consciousness-raising scores indicated that both groups were fairly conscious of the importance of maintaining a healthy weight prior to the start of the study. ANCOVA indicated that, at posttest, the experimental group had significantly higher consciousness of maintaining a healthy weight after seeing Super Size Me than the control group. At the follow-up test, mean scores between these groups remained significantly different from each other.

DISCUSSION

Results indicate that Super Size Me led to an increase in knowledge of nutrition, fast food, and obesity-related health conditions that persisted at least an average of 9 days after viewing this film. These results support recent
research investigating the impact of broadcast media on knowledge (7,39).

Overall, Super Size Me had short-term effects on attitudes about the (un)healthfulness of fast food and personal concern about maintaining a healthful weight. These findings are similar to those reported by others (39,40) that viewing a health-related drama program had a substantial impact on health-related attitudes. In contrast, the Stanford Five-City Project (41), which examined the effects of mass media on attitudes regarding physical activity, had little effect on attitudes.

Exposure to the movie Super Size Me substantially increased the experimental group’s self-efficacy for minimizing intake of fast food in the short term. Although this finding contrasts with those of an education intervention with children (42), it supports the findings of other interventions that also increased self-efficacy for health behaviors (39,43,44). It must be emphasized that the methodologies of these previous interventions were more elaborate than the film intervention of this study. The evidence that merely watching a film can produce changes comparable to educational exercises or counseling sessions lends support to the concept of film as a powerful motivational tool, at least in the short term.

The locus of control data finding that viewing Super Size Me significantly increased internal health locus of control at the posttest and significantly decreased external: chance health locus of control at the posttest and follow-up test indicates that the film positively affected locus of control. That is, Super Size Me viewers believed they were more responsible for their health status and that chance played a lesser role in determining their health after viewing the film. Few studies could be located that have investigated the effects of interventions on locus of control. Nevertheless, other researchers have found positive associations between degree of internal locus of control and ability to achieve or maintain a healthful weight (45) and internal locus of control and diet quality (46). The findings of increased internal and decreased external: chance loci of control after seeing Super Size Me may increase motivation to maintain a healthy weight and minimize fast-food intake.

The significant increase in emotional arousal provides evidence that viewers responded emotionally to the film Super Size Me in the short term, reinforcing previously reported findings that health-related dramatic broadcast media can inspire emotional changes (40). Super Size Me also increased awareness of the importance of maintaining a healthy weight. Although few studies have investigated the effect of media or educational interventions on consciousness-raising for maintaining a healthy weight, researchers have reported an association between consciousness-raising and smoking and quitting behavior (47). Thus, the increase in consciousness among Super Size Me viewers may precede positive health-behavior changes that lead to weight loss and/or maintenance.

Results indicate that Super Size Me helps viewers advance to a higher stage of change in the short term and this change persisted for at least 9 days after viewing the film. Thus, the film appears to prompt individuals, at least those in the pre-action stages, toward changing their fast-food intake. Although no studies investigating stage of change and broadcast media could be located, other types of interventions, such as a community-based diabetes education program (48), have reported similar changes in stage. Likely, the film’s ability to emotionally arouse viewers and raise their consciousness helped participants advance their stage.

There are limitations of this study that must be acknowledged. Study participants were a convenience sample of healthy, normal-weight college students enrolled at a large, urban university. The study participants may not have been as sensitive to the film’s subject matter as other population groups, such as those who are obese and/or suffering from obesity-related conditions. Thus, the findings cannot be generalized to other population groups or other students at other colleges. However, it is important to consider that participants were from a university with a highly diverse student body of more than 50,000 students from all regions of the United States and, thus, represent a broad cross-section of students. In addition, the proportion of white and female students enrolled is reflective of national enrollment levels (49). A second limitation was the reliability of the locus of control scales; while these are not as high as generally desired, they are typical of those reported by its original developer (31). A final limitation was that dietary behavior was not assessed; this was because participants were involved in this study for a short time (spanning approximately 3 weeks), which precluded them from making and measuring meaningful changes in fast-food intake. Nonetheless, factors considered to mediate actual behavior change (eg, knowledge, attitudes, self-efficacy, locus of control) were assessed, as was stage of change (a self-reported measure of behavior) (50-60).

CONCLUSIONS

In conclusion, the film Super Size Me substantially increased short-term knowledge, certain attitudes, self-efficacy, internal locus of control, stage of change, emotional arousal, and consciousness-raising, and substantially decreased external: chance locus of control of college students. However, important changes that persisted were limited to knowledge, stage of change, consciousness-raising, and external: chance locus of control. Thus, it appears that Super Size Me positively affected several factors thought to mediate actual behavior as well as employed change processes (ie, emotional arousal and consciousness-raising) that advanced stage of change for reducing fast-food intake. These findings are particularly noteworthy in light of the content validity of all the measures, the strength of the reliabilities of all measures except locus of control, and the robustness of the data analysis (ie, ANCOVA coupled with random assignment to study groups) (26).

Praise for the film as a behavior-change catalyst, at least over a time span of approximately 9 days, was supported by this study’s findings. Considering the difficulty in making and maintaining dietary changes and success of mass-media campaigns (39), incorporating Super Size Me into a comprehensive, structured nutrition intervention program targeting obesity would perhaps render it even more successful in facilitating behavior change. Future research should investigate the effect of this film on other audiences. In addition, the usefulness of Super Size Me as a part of a comprehensive nutrition
education program that includes follow-up measures administered after an extended period is recommended. This study is one of the first to attempt to increase our understanding of a neglected area of media research; that is, examining and describing the effect of broadcast media (i.e., a movie) on nutrition knowledge and psychosocial factors. Although it is difficult to conduct well-controlled, naturalistic field experiments focusing on a medium as ubiquitous as media, the findings of this study make it clear that the effect of the incidental, informal nutrition education taught via a movie can be educationally and psychologically meaningful and, thus, warrants further study (61).

This study provides evidence for the usefulness of *Super Size Me* in dietetics practice. Food and nutrition professionals practicing in the field of weight management could benefit patients by incorporating this film into behavioral counseling sessions or utilizing it as a consciousness-raising and emotional arousal adjunct to counseling. Incorporation of *Super Size Me* into weight-management interventions may substantially affect individual client outcomes, and may ultimately lessen the impact of the obesity epidemic.

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