



Published in final edited form as:

*J Nutr Educ Behav*. 2008 ; 40(3): 160–167. doi:10.1016/j.jneb.2007.04.376.

## A Pilot Study of an Online Workplace Nutrition Program: The Value of Participant Input in Program Development

Tara Cousineau, PhD, Brian Houle, MPH, Jonas Bromberg, PhD, Kathrine C. Fernandez, MPH, and Whitney C. Kling, BA

Inflexxion, Inc., Newton, Massachusetts

### Abstract

**Objective**—Tailored nutrition Web programs constitute an emerging trend in obesity prevention. Initial investment in innovative technology necessitates that the target population be well understood. This pilot study's purpose was to determine the feasibility of a workplace nutrition Web program.

**Design**—Formative research was conducted with gaming industry employees and benefits managers to develop a consensus on workplace-specific nutrition needs. A demonstration Web program was piloted with stakeholders to determine feasibility.

**Setting**—Indiana, Mississippi, Nevada, and New Jersey gaming establishments.

**Participants**—86 employees, 18 benefits managers.

**Intervention**—Prototype Web program.

**Main Outcome Measures**—Concept mapping; 16-item nutrition knowledge test; satisfaction.

**Analysis**—Concept mapping was used to aggregate importance ratings on programmatic content, which informed Web program curriculum. Chi-square tests were performed postintervention to determine knowledge improvement.

**Results**—(1) Employees and benefits managers exhibited moderate agreement about content priorities for the program ( $r = 0.48$ ). (2) There was a significant increase in employees' nutrition knowledge scores postintervention ( $t = 7.16$ ,  $df = 36$ ,  $P < .001$ ); those with less knowledge exhibited the greatest gains in knowledge scores ( $r = -0.647$ ,  $P < .001$ ).

**Conclusions and Implications**—Employees and benefit managers do not necessarily agree on the priority of nutrition-related content, suggesting a need for programs to appeal to various stakeholders. Computer-based approaches can address various stakeholder health concerns via tailored, customized programming.

### Keywords

computer-based education; employees; nutrition; worksite; tailoring

## INTRODUCTION

There is a growing awareness among the public and private sectors that worksite initiatives are imperative in nutrition education and obesity prevention. For instance, there is a direct

relationship between health risk level and health care expenditure, for example, obese individuals spend over a third more on health services than average individuals.<sup>1</sup> Encouraging research has shown that specific worksite interventions can result in employees choosing to lower the amount of fat calories consumed and increase consumption of fruits, vegetables, and dietary fiber.<sup>2</sup> Several literature reviews suggest that despite the wide variability in worksite management health programs and methodological limitations of study designs, the most effective programs are comprehensive and offer individualized risk-reduction counseling to employees with the highest health risk.<sup>3–6</sup> Such individualized programs are expensive, and there is a pressing need to develop cost-effective and easily disseminated programs. Clearly, developing effective lifestyle programs that appeal to all stakeholders, such as insurers, employers, and employees, poses both a challenge and an opportunity.

Nationally, corporate health initiatives have sprung up in response to the obesity epidemic to encourage more healthful lifestyles for employees. One example is the Institute on the Costs and Effects of Obesity, organized by the National Business Group on Health (NBGH), a group of 245 large employers that cover the benefit costs of 50 million people.<sup>7</sup> Effective guidelines for workplace settings are important because the health promotion activities offered by employers vary widely, ranging from gym subsidies, weight management classes, cooking classes, healthful food service, and flexible health benefits, to name a few. Because the projected costs to employers and health insurers related to the health consequences of poor diet and low physical activity has become such an issue (eg, presenteeism, absenteeism, escalating health insurance premiums), the NBGH has recommended the use of innovative approaches to nutrition education and obesity prevention. Currently, the terms eHealth and “e-besity” are now being used to refer to computer-mediated interventions,<sup>8</sup> which include telephone counseling, computer-mediated and on-line programs, cell phone text messaging, and personal digital assistants (PDAs).<sup>9–12</sup> The growing popularity of these approaches is now grounded in evidence-based research and can be a potentially cost-effective solution to reach larger audiences.<sup>13–19</sup> Furthermore, given the results of published data on the efficacy of brief nutrition interventions to modify dietary behaviors in research settings,<sup>20–24</sup> it is a natural and timely step to view the use of computer technologies as an attractive solution.<sup>13</sup>

### Using Technology To Reach Employees

Translation of eHealth research into commercially viable offerings for employers is vital. Because computer-mediated interventions, particularly on-line formats, are interactive and in real time, the information they provide can be specifically tailored to the end users, thereby enabling personally relevant information to reach a large target audience at relatively low cost. This process is particularly efficient since access to nutrition specialists is limited and cost of counseling is high.<sup>25</sup> However, the question remains whether employees and employers find such approaches appealing and would consider adopting them.

The present study describes the formative research to develop an on-line, workplace nutrition program called *Working on My Health: Nutrition* (WOH-N). Gaming industry employees and benefits managers were chosen as target audiences for the formative research because they (hotel, food and beverage, and casino workers) face a particularly challenging environment in which to control poor eating and physical activity habits, including long hours, shift work, standing work, and poor food options. Also, these groups may not have ready access to the Internet during work hours, raising the question of eHealth viability for nonsedentary work environments. The overall approach in this study was informed by “consumer-based health communications” (CHC),<sup>26</sup> which identifies a process for

transforming scientific recommendations into health promotion message strategies that are relevant, meaningful, and compelling to the intended audience.

## DESCRIPTION OF THE DEVELOPMENT PROCESS

Formative research with stakeholders was completed to gather a consensus on the most important content areas for a work-place nutrition Web education and prevention program. The approach involved gathering key ideas and features from gaming industry employees and benefits managers (from the gaming industry and other industries) as part of a “concept mapping” (CM) procedure.<sup>27</sup> Concept mapping, as developed by Trochim, offers a quantitative process for structured analysis of qualitative data<sup>27–29</sup> and has been used in the area of on-line nutrition curriculum development with other audiences.<sup>30–31</sup> Concept mapping consists of several sequential steps: (1) elicitation research, where individual interviews with stakeholder participants generate specific ideas in response to a stimulus question; (2) consensus building, where participants respond to the collection of statements by independently sorting them into logical thematic categories and then rating the relative importance of each statement; (3) analysis, whereby a specialized software program (Concept Systems Software V.4. Concept Systems Inc., Ithaca, NY, 2004–2006) is used to generate conceptual maps; and (4) interpretation of results and translation to the educational program.

### Step 1: Stakeholder Interviews

Two audiences participated in semistructured interviews in the item generation phase of CM. A total of 30 participants were recruited (Table 1). Gaming industry employees (N = 17) were recruited from across several departments (ie, casino, food and beverage, hotel, and administration) and geographic locations (Indiana, Mississippi, Nevada, and New Jersey). Benefits managers (N = 13) from the gaming and other industries (eg, nonprofit organizations, manufacturing, printing and publishing, hospital, restaurant, state government, and biotechnology) were also recruited. These other industry managers were included to obtain a broader human resources perspective on the challenges of promoting healthful nutrition behaviors in the workplace (ie, information from more than 4–6 gaming benefits managers in a large organization would likely lead to saturation). They were recruited from professional organizations such as the Society for Human Resource Management and the Northeast Human Resources Association in an effort to extend the knowledge base for the needs of this audience. The project manager called the companies in other industries to request phone interviews with benefits managers.

Participating employees were recruited via flyers at their respective casino locations. They responded to a worksite human resources liaison, who forwarded contact information to the research staff. After completing the informed consent process, each participant was e-mailed a demographic questionnaire, and a time for a telephone interview was arranged. A semistructured interview protocol for employees and benefits managers was conducted by a member of the research team, and the phone session was recorded. The verbal interview questions included eliciting participants’ input on specific nutrition concerns and questions, common worksite nutrition barriers experienced, and strategies to overcome those barriers. Further, participants were asked to answer a stimulus question during the interview as part of the concept mapping exercise: “Please list at least 10 key topics you would like covered in a workplace Web site about nutrition and exercise.” After the interviews, the research team reduced the resultant statement list of over 400 suggestions by removing redundancies, combining similar terms, and removing items that were outside the scope of the project. A final list of 59 statements was used for the sorting and rating procedure. Examples of statements included eating on a busy schedule, nutrition and health conditions, and cost-cutting tips to buying nutritious foods (Table 2).

## Step 2: Prioritizing Nutrition Content

The same volunteers from Step 1, in addition to new volunteers, were invited to complete the sorting and rating procedure several weeks later, to meet our target goal of 36 participants in this step, that is, 8 original participants plus 15 new participants, for a total of 23 employees; 13 benefits managers (8 of the original managers from Step 1 and 5 new managers from the gaming establishment). For scheduling reasons, not all employees and benefits managers could participate in both concept mapping steps, requiring further recruitment for additional participants. It is common that different subjects participate in the 2 steps of CM.<sup>27</sup>

Participants were recruited in the same method as described in Step 1. They were asked to independently complete 2 activities for this CM phase. First, participants were asked to sort each statement listed on a card into piles “in a way that makes sense to you” and to label each pile. Second, all statements were rated by each participant on a 5-point scale on the relative importance of each item to include in a workplace Web site about nutrition and exercise (1 = Extremely Unimportant to 5 = Extremely Important). This data was subsequently entered into the concept mapping software to aggregate participant ratings and groupings. Average ratings for the statements and statistical summaries were generated using a combination of multidimensional scaling and cluster analysis. Output from the software allowed for the ratings to be represented pictorially via a “map,” showing the relationship between the conceptual groupings.<sup>27–29</sup> Once analyses were completed, the concept mapping data were reviewed by the research team and used to make decisions about the structure for the program in terms of: (1) the number of content domains; and (2) specific topic areas to include within each domain.

Table 1 summarizes the demographics for all study participants. A single concept map with 4 clusters was generated by the concept mapping program (Figure). Four conceptual clusters were defined: 1) Nutrition; 2) Physical Activity; 3) Healthy Eating; and 4) Employee Participation and Support. A review of these clusters in Table 2 reveals how the statements clustered together based on how participants grouped and prioritized each statement. The map presents each cluster as having 1 to 5 layers. Clusters with more layers contained statements that were considered relatively more important, netting higher average ratings (legend depicts value ranges). The spatial size of the cluster is a visual representation of how frequently participants sorted the statements in a given cluster together. Thus, the smaller the area of the cluster, the more frequently participants sorted these statements together. Conceptually, a small, layered cluster reflects a more defined concept, whereas larger clusters suggest a less well-defined concept.

The Figure represents how participants grouped programmatic “clusters.” Given the nature of the study, one might expect that the “Nutrition” cluster would net high ratings. It did indeed receive the highest mean rating ( $M = 4.03$ ) among clusters. Statements in this 5-layered cluster included basic nutrition information, diet-related health conditions, and nutrition needs for men and women. The highest rated statement was “finding nutrition information that is credible” ( $M = 4.26$ ). The Physical Activity cluster ( $M = 3.86$ ) also received relatively high average ratings, and the top-rated statement in this cluster was “making lifestyle changes” ( $M = 4.41$ ). A broader cluster was labeled “Healthy Eating.” In contrast to the “Nutrition” cluster, these statements pertained less to factual information and more to behavioral steps or “how to’s,” eg, ways to avoid skipping meals, how to pick healthful food options in fast-food restaurants, and eating on a busy schedule. The top-rated item was “satisfying food cravings” ( $M = 4.35$ ). The “Employee Participation and Support” cluster ( $M = 3.67$ ) was a single-layer cluster and represented wider variability in statements. The highest rated statement pertained to “weight loss/weight management” ( $M = 4.38$ ). Other items included: motivation to follow-through with nutrition and fitness goals;

incentives; self assessments and quizzes; links to other resources; and exchanging nutrition ideas with others. In essence, this cluster represented a range of interactive skill-building exercises, tools, and community support features.

Interestingly, there was only moderate agreement between the employees and benefits managers on content prioritization ( $r = 0.48$   $p < .05$ ). There was disagreement in regard to the importance ranking of each cluster. Specifically, physical activity was identified by employees as the second most important category, whereas benefits managers rated it as the least important cluster. On the other hand, benefits managers rated the “Employee Participation and Support” cluster higher than the employees did. Such discrepancies can inform program development in important ways. A computer-tailored approach, in particular, can attend to both individual needs via personalized risk assessment and motivational messaging, whereas employer needs can be attended via customizable content areas to promote employee participation, incentives, and on-line support.

It was helpful to see the visual depiction via the CM clusters, as this informed the Web design team about major areas to build. The 4-cluster concept mapping solution represented the architecture and layout for the worksite demonstration Web program. It was divided into 5 major areas: (1) basic nutrition information; (2) information related to fitness and exercise; (3) healthful eating guidelines; (4) goal setting; and (5) worksite specific information. The team decided to separate the “employee participation and support” cluster into 2 (goal setting and worksite-specific information) to keep the section pertaining to personalization and tailoring separate. Further, the CM statements and the associated mean ratings were critical to informing the content, eg, what types of articles and health information were needed, expert frequently asked questions (FAQs), and the kinds of assessments and tools that consumers would find appealing.

## DESCRIPTION OF THE PROGRAM EVALUATION

Based on the CM results, a prototype Web site called *Working on My Health: Nutrition* (WOH-N) was developed for feasibility testing. It portrayed approximately 10% of the content and interactive tools anticipated to be in the final Web site and balanced the needs of both employees and benefits managers using text, graphics, and audiovisual-based educational content (Macromedia Flash®; Adobe, San Jose, CA) and html Web pages. Sample content sections were created based on universal psychosocial and health promotion approaches,<sup>32</sup> whereas tailored features were based on evidence from computer-mediated nutrition education.<sup>14</sup> Because the program was only partially functional, the tailoring features were simulated based on a mock profile. The program included: (1) sample dietary risk assessment and personalized feedback; (2) basic nutrition information; (3) the effects of diet and exercise on the body; (4) strategies for healthful eating and meal preparation; and (5) sample information and incentives for staying healthy in the workplace.

As a preliminary test of feasibility, a pre- and post-knowledge test was conducted with gaming industry employees only, and a satisfaction survey was collected from all stakeholders. Fifty-four new gaming industry employees across 4 departments (casino, food and beverage, hotel, and administration) and 2 geographic locations (New Jersey and Nevada) were recruited to participate in knowledge testing.

Participants were recruited and consented to participate in the same manner as described in the formative development process. All research activities were completed at the 2 casino sites. Prior to reviewing the demonstration Web site, employees were asked to complete the pre-intervention knowledge test. Participants completed a brief demographic survey; they also listed, in writing, their perceived barriers to nutrition and physical activity (open-ended question). They viewed the demonstration Web site for 30 minutes, which was followed by

the post-intervention knowledge test and a satisfaction survey. The 13 benefits managers also viewed the Web site and completed a satisfaction survey only. Compiled interview narrative data revealed that highly endorsed barriers to healthful eating included lack of time, large portion sizes, and cost; barriers to exercise included lack of time and low motivation. Of the barriers selected by employees, the mean number of barriers to healthful eating was 3.5, whereas the mean number of barriers to exercising was 1.9. There was no trend indicating that people with higher body mass index (BMI) named more barriers to healthful eating ( $r = 0.272, P = .12$ ) but there was a significant association between BMI and more barriers to exercise ( $r = 0.361, P = .036$ ).

The 16-item nutrition knowledge test was adapted from a previous study of a college population to assess changes in employees' knowledge after a brief exposure to the demo Web site.<sup>33,34</sup> For each participant, a percent-correct score was calculated on the pretest and posttest (SPSS V 13.0; SPSS Inc., Chicago, IL 2006). The mean baseline score was 9.3 (SD = 2.1), and the posttest mean score was 12.3 (SD = 1.9). Using a paired-samples *t* test, a statistically significant increase was found in knowledge scores post-intervention ( $t = 7.16, df = 36, P < .001$ ). There was a negative correlation between baseline knowledge score and improvement in knowledge score, meaning that those with low initial levels of nutrition knowledge experienced the greatest improvement ( $r = -0.647, P < .001$ ).

The satisfaction survey assessed employees' and benefits managers' reactions to the program concept, proposed content, and content delivery strategy and elicited suggestions for improvement. Overall, satisfaction was high, with all participants ( $N = 67$ ) reporting that they were "very" or "extremely" satisfied with the overall presentation of the Web site (mean rating of 4.2 on a 5-point scale). All employees indicated that they would use the site if it were to be provided by their employer, and the benefits managers reported that they would offer such a program to their employees provided it came at reasonable cost. When asked about enhancements, employees commented that they would like to see additional content relating to "aging and nutrition," "pros and cons of dieting," "more explanation about fats," and "more about calories." Employees also indicated that they would be interested in an interactive voice recognition feature (IVR) for nutrition input and feedback as part of a final Web-based program, suggesting that further innovations are desirable.

## DISCUSSION

Nutrition education for employees is an important topic, and businesses vary in their approaches to reaching out to employees.<sup>3-6</sup> National attention to the obesity epidemic will likely spur employers to direct more attention to nutrition education and obesity prevention.<sup>7</sup> Employer-delivered health programs need to focus on the issues of relevance to employees and their particular service industry challenges. This pilot study offers particular insight to nutritional concerns of shift-work employees in the gaming industry. They indicated many concerns about attaining proper nutrition and reported a number of barriers specific to the workplace. Benefits managers also raised a number of challenges, such as eliciting employee participation. Both stakeholders agreed on the essential components for an interactive Web-based nutrition program that included personalized and tailored features, practical strategies for healthful meal planning on a busy schedule, basic nutrition knowledge, and skill building to manage cravings and to make more healthful food choices in fast-food environments. Importantly, developing a program that relates to employee life and is informed by their perspective seems to be central to interest in such a program. An important strength of this pilot program is that development was driven by actual concerns of both the employee and the employer. Most of the computer-based programs described in the literature are not publicly available for review. As such, little information is provided on actual program content, nor is information provided on whether the target audience informed

the development. Formative research with stakeholders is a critical step in developing on-line workplace obesity prevention initiatives, and this study provides a direction for programming planning.

There are several limitations to this qualitative study. Participants were recruited by flyers and may not represent employees who are not interested or motivated to participate in a research study. The participants were from a specific service industry, which may not reflect the nutrition concerns of employees in other industries or settings. However, an argument can be made that this employee group represents a challenging work environment in which programming can be more easily customized to other industries (eg, desk workers). Further research is needed to assess whether the results are generalizable to other industries. In addition, the satisfaction survey results should be interpreted with caution given the potential for employees to report socially desirable feedback. Similarly, all stakeholders were compensated for their input, which is a potential source of bias. However, such compensation was commensurate with traditional interview and focus group fees. Finally, since this was a prototype Web site, with limited functionality, the efficacy of the program could not be tested. The results of the current study represent an initial step toward the development of a theory-based, interactive program that educates and tailors nutrition information to worksites.

## IMPLICATIONS FOR RESEARCH AND PRACTICE

Some may argue that there are a plethora of on-line venues for diet and weight management for the health consumer. So what would make a worksite nutrition program any different? The argument is that *employees* would be more apt to use a tailored eHealth nutrition program if (1) it is part of a health benefit package, and (2) it is connected to their particular worksite environment in some tangible way, eg, incentives, contests, and community message boards. Therefore, it is important to first ask employees, or the target audience of interest, what could work for them before investing in innovative programs simply because the strategy, however critical, is based in evidence-based research. What works for one population may not necessarily work for another.

It makes practical sense that eHealth programs could provide important information to *employers, health insurers, and policy makers* in the areas of needs assessment, risk management, and return on investment. Use of technology offers an opportunity for both public and private health sectors to inform each other and to collaborate on innovative solutions to the national obesity epidemic. Further testing of on-line interventions, such as *Working on My Health: Nutrition*, will likely contribute to a growing body of evidence for technology-based solutions.

## Acknowledgments

This project was supported by a grant from the National Institutes of Health/NIDDK, IR43CA108066-01. This research was approved by Inflexxion, Inc. Institutional Review Board, which is registered with the Department of Health and Human Services. Special appreciation is extended to the contributions of our excellent consultant team, including: Michael R. Lowe, PhD, at Drexel University; Michele W. Ciccazzo, PhD, RD, at Florida International University; Christine Economos, PhD, at Tufts University School of Medicine and Tufts University School of Nutrition Science and Policy; Kristy Hendricks, MS, ScD, at Tufts University School of Medicine; and Karen Calfas, PhD, at San Diego State University. Thank you as well to Gary Earl, former Vice President of Benefits, Caesars Entertainment (now Harrah's Entertainment), for his help on this research.

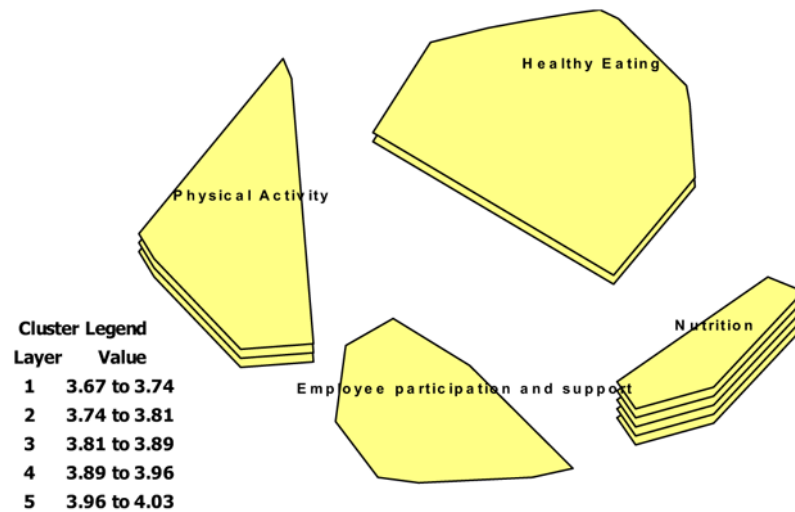
This project was supported by a grant from the National Institutes of Health/NIDDK, IR43CA108066-01.

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**Figure.**

Concept map. Statistical summary from the sorting of all statements by each participant “in a way that makes sense to you,” and the rating of all statements by each participant on a five-point scale on the relative importance of each item to include in a workplace website about nutrition and exercise (1=Extremely Unimportant to 5=Extremely Important). Clusters with more layers were considered relatively more important. Spatial cluster size represents how frequently participants sorted statements in a given cluster together.

**Table 1**

## Characteristics of Study Participants

Characteristics	Concept Mapping Step 1: Stakeholder Interviews	Concept Mapping Step 2: Prioritization of Content	End User/ Satisfaction Testing
<b>Employees</b>			
<u>Departments</u>			
Casino	6 (35%)	12 (52%)	12 (22%)
Food & beverage	-	3 (13%)	2 (4%)
Administration	8 (47%)	4 (17%)	17 (31%)
Hotel	2 (12%)	2 (9%)	4 (8%)
Other	1 (6%)	2 (9%)	12 (22%)
Declined answer	-	-	7 (13%)
(Total)	17	23	54
<u>Age</u>	-	-	42.7 (range 22–58)
<u>Race/ethnicity</u>			
White	16 (94%)	19 (82%)	31 (57%)
Nonwhite	1 (6%)	4 (18%)	16 (30%)
Declined answer	-	-	7 (13%)
<u>Gender</u>			
Male	5 (30%)	8 (35%)	16 (30%)
Female	12 (70%)	15 (65%)	38 (70%)
<u>Weight</u>			
Underweight	-	-	-
Normal	4 (23%)	4 (17%)	17 (31%)
Overweight	8 (47%)	5 (22%)	16 (30%)
Obese	5 (30%)	4 (17%)	21 (39%)
Declined answer	-	10 (44%)	-
<b>Benefits Managers</b>			
<u>Industry</u>			
Casino	3 (23%)	7 (54%)	—
Other	10 (77%)	6 (45%)	—
(Total)	13	13	—
<u>Race/ethnicity</u>			
White	13 (100%)	13 (100%)	—
Nonwhite	-	-	—
<u>Gender</u>			
Male	2 (15%)	3 (23%)	—
Female	11 (85%)	10 (77%)	—

**Table 2**

## Statements by Concept Map Cluster with Average Ratings

Statements	Average Rating*
<b>Cluster: Healthy eating</b>	<b>Average: 3.78</b>
Satisfying food cravings	4.35
Finding healthful and tasty substitutes to foods you enjoy	4.32
Understanding portions/do I know when I'm overeating	4.32
How to pick healthful options in a fast-food restaurant	4.21
Cost-cutting tips to buying nutritious food	4.21
Healthful snacks	4.18
Healthful food and maintaining energy level	4.18
Preparing a meal that is satisfying and healthful	4.15
Getting more fruit and vegetables into meals	4.12
Eating on a busy schedule	4.09
Healthful meals for noncooks	4.03
Ways to avoid skipping meals	3.91
Healthful options for individuals who are "meat and potato" lovers	3.82
Ways to avoid eating late at night	3.76
Articles on good and bad fat	3.76
Preparing healthful brown-bag lunches at home	3.76
Dehydration/drinking enough water	3.74
Digestion and eating fast	3.52
Recipe exchange	3.47
Information on hydrogenated oils	3.24
Low-sodium diets	3.21
Organic food	3.00
Effects of microwaving food	2.79
Vegetarianism	2.48
<b>Cluster: Nutrition</b>	<b>Average: 4.03</b>
Finding nutrition information that is credible	4.26
Nutrition and health conditions (diabetes, heart disease, hypertension, pregnancy, etc.)	4.18
Nutrition information for the family	4.18
Basic nutrition information	4.15
Nutrition and emotional health	4.12
Nutrition requirements for every stage of life	4.06
Nutritional content of food found in employee cafeteria or restaurant	4.00
Nutritional needs for men and women	4.00
Articles on lowering cholesterol	3.85
Nutrition and ethnic food	3.50
<b>Cluster: Employee participation and support</b>	<b>Average: 3.67</b>
Weight loss/weight management	4.38
Motivation to follow through with set nutrition and fitness goals	4.26

<b>Statements</b>	<b>Average Rating*</b>
Tools/calculators (calculate body mass index, calories in a meal, vitamin/mineral intake, etc.)	4.00
Obesity	3.97
Submit suggestions for future nutrition topics	3.79
Self-assessments and quizzes	3.79
Links to other resources	3.71
Comparison of different diet fads	3.65
Peer stories/personal stories from other employees	3.35
Exchanging nutrition ideas and strategies with others via listservs, electronic bulletin boards, or chatrooms	3.35
Holistic/nonconventional approaches to losing weight	3.06
Articles sensitive to race/ethnicity/geographic area	2.74
<b>Cluster: Physical activity</b>	<b>Average: 3.86</b>
Making lifestyle changes	4.41
Addressing stumbling blocks to health (pricey fitness clubs, no time, odd work hours, etc.)	4.18
Body image	4.15
How to get physically active	4.15
What is a healthful weight	4.15
Simple exercise routines to do at home, work, or lunchtime	4.12
Vitamins	3.88
Tracking caloric intake, no. hours exercised, or other goals you want to set for yourself	3.85
Osteoporosis/getting enough calcium	3.79
What is physical activity	3.59
Food to help build muscles	3.56
Supplements	3.50
Value of high protein sports bars and sports drinks	2.82

\* All statements were rated by each participant on a 5-point scale on the relative importance of each item to include in a workplace Web site about nutrition and exercise (1 = Extremely Unimportant to 5 = Extremely Important).