Worksite and family education for dietary change: the Treatwell 5-a-Day program

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Abstract

The National Cancer Institute’s ‘5-a-Day for Better Health Campaign’ is examining the efficacy of interventions in increasing the consumption of fruits and vegetables to five or more servings a day. This paper presents the study design, intervention and baseline survey results of the Treatwell 5-a-Day project, a randomized, controlled worksite-based intervention study. Twenty-two community health centers were randomly assigned to either a Minimal Intervention, Worksite Intervention or Worksite Plus Family Intervention. The Worksite Intervention included participation of employee advisory boards, programs aimed at individual behavior change and programs aimed at changes in the worksite environment. The Worksite Plus Family Intervention incorporated family-focused interventions into the worksite program, including a learn-at-home program, family newsletter, family festival and materials mailings. A self-administered survey was conducted prior to randomization (mean response rate: 87%, n = 1359). Twenty-three percent reported consuming five or more servings of fruits and vegetables a day. Consumption of fruits and vegetables was directly associated with level of household support for healthy eating. The Treatwell 5-a-Day intervention model has the potential to enhance existing worksite-based intervention through incorporation of its family focus, especially given the association of household support with individual eating habits.

Introduction

Diet has been estimated to contribute to approximately 35% of all cancer incidence (Doll and Peto, 1981; USDHHS, 1988; Willett, 1990). Consistent evidence points in particular to a protective role played by consumption of fruits and vegetables in a large number of epithelial cancers (Steinmetz and Potter, 1991a,b; Willett, 1994). Despite the strong scientific evidence, most Americans report consuming fewer than the five servings per day recommended by the National Academy of Sciences (1989), the US Department of Agriculture (1992) and the US Department of Health and Human Services (1990) (Subar et al., 1992). Recent national surveys indicate that about 20% of the population consume the recommended five or more servings per day (Serdula et al., 1995; Subar et al., 1995).

Worksites are an increasingly common channel for promoting health behavior change in large segments of the population (USDHHS, 1992). However, very few studies have assessed the effectiveness of worksite-based nutrition education programs. A recent review reported that only four randomized studies assessing the effects of worksite nutrition education programs have been published since 1980 and in only one of these studies was the worksite the unit of analysis (Glanz...
et al., 1996). Using the worksite as the unit of analysis is necessary in worksite-based interventions that take advantage of the worksite environment and structures, since individual behavior change is embedded in worksite-level changes.

This paper describes a study designed to assess the effectiveness of a worksite-based nutrition intervention promoting increased consumption of fruits and vegetables. Treatwell 5-a-Day is part of the National Cancer Institute’s ‘5-a-Day for Better Health Campaign’ (Havas et al., 1994), designed in response to the scientific evidence about the protective role of fruits and vegetables and the reported low intake of fruits and vegetables in the US population. This study uses a randomized, controlled design in which the worksite is the unit of randomization, intervention and analysis, and is one of the first studies to assess the impact of incorporating education for families into a worksite-based health promotion program. This project responds to two key challenges currently facing worksite health promotion.

The first challenge is to identify methods for incorporating health behavior change into the social context of individuals’ lives. Intervention programs are likely to be most effective in promoting and sustaining behavior change when change occurs simultaneously in the social norms and environments in which people live (Abrams et al., 1986; Bandura, 1986; McElroy et al. 1988). However, even recent worksite health promotion programs that have targeted both employee and worksite changes have produced only small behavior changes. For example, at the conclusion of the 2-year Take Heart project, a randomized study of 26 worksites, no significant differences were observed between the two groups in smoking rates, dietary intake or employee cholesterol levels (Glasgow et al., 1996). In the recently concluded Working Well Cooperative Trial conducted in four study centers, although significant but small differences in dietary patterns were observed between the intervention and control sites for the trial overall, no trial-wide effects were observed for smoking cessation (Sorensen et al., 1996). This study responds to this challenge by using the worksite health promotion program to send messages to workers’ homes, thereby incorporating health behavior changes into the social context of workers’ home and work lives.

Family or household interaction and support are likely to play an important role in determining and promoting change in individual eating habits. Yet prior worksite studies targeting diet have not assessed the impact of family support on employee eating behavior (Glanz et al., 1996). Individual health goals, including those for eating behaviors, may be influenced by family interactions (Yetley and Roderick, 1988). Children may pressure their parents to make healthy changes in diet and nutrition messages may carry more weight in light of parents’ concerns about their children’s health (Baranowski and Nader, 1985). Family members may be an important source of support; spousal support has been related to weight loss and adherence to low-fat, low-cholesterol diets (McCann et al., 1990). Modeling and the family’s social norms are also likely to influence health behaviors (Deustch and Gerard, 1955; Hertzler, 1983; Bandura, 1986; Epstein et al., 1987; Crocket et al., 1989). To examine the potential effects of the family environment, Treatwell 5-a-Day is systematically assessing the incorporation of a family component to its worksite-based nutrition intervention.

The second challenge is to design and evaluate health promotion programs that respond to the needs of multiethnic populations. The face of the US is changing; persons of color and ethnic minorities make up an increasingly larger proportion of the US population. For example, in the decade between 1980 and 1990, the Hispanic population in the US increased about 53%, from 14.6 million (6.4% of the population) to 22.3 million (9.0%), as a result of both immigration and natural increase. The number and percent of blacks also increased, from 26.5 million (11.7%) to 30.0 million (12.1%) (Quinby, 1992; Fernandez et al., 1993; Kerner et al., 1993; Snell, 1993). Recent investigations have shown that race and ethnicity play an important role in dietary habits. Subar et al. (1995) found that compared to African-
Americans and Whites, Hispanics eat the fewest number of fruits and vegetables. Patterson et al. (1995) reported that Whites tend to eat a more varied diet than either African-Americans or Hispanics. To be effective, interventions with diverse ethnic groups must take into account differences in cultural heritage, ethnic identity and socioeconomic status (Bass, 1982; Dana, 1993; Alexander, 1995). The Treatwell 5-a-Day study is testing the effectiveness of an intervention designed to meet the needs of ethnically diverse populations; nearly half of the workers employed in the participating worksites are African-American or Hispanic.

The purpose of this paper is to describe the theoretical rationale for the Treatwell 5-a-Day project and the application of the theoretical model to the intervention design, thereby delineating the strategies used to respond to these two critical challenges. In addition, this paper presents baseline data that underline the need for this approach. Specifically, analyses of data from the baseline survey of employees describe the relationship of worker eating patterns to worker characteristics, including reported levels of co-worker and family support for healthy eating.

**Methods**

The Treatwell 5-a-Day study design permits us to address two major questions for worksite intervention initiatives. Does workers’ consumption of fruits and vegetables increase as a result of the Treatwell 5-a-Day worksite intervention, when compared to a minimal intervention control? Does the incorporation of a family-based intervention into the worksite-based intervention enhance the change in workers’ eating patterns? To address these questions, 22 worksites were randomly assigned to three groups: (1) Minimal Intervention (control; eight sites), (2) Worksit Intervention (seven sites) and (3) Worksite Plus Family Intervention (seven sites). See Figure 1.

The Treatwell 5-a-Day study uses a randomized, controlled research design, with the worksite as the unit of assignment, intervention and analysis. A clearly specified set of secondary hypotheses also are being assessed, based on surveys of employees and worksite representatives, as shown in Figure 2 and described below. A process evaluation system has been developed to assess the extent to which intervention activities were implemented and to estimate the costs associated with implementation. A baseline survey of workers assessed eating patterns and the degree of co-worker and family support for healthy eating.

**Treatwell 5-a-Day worksites**

Treatwell 5-a-Day is being conducted in 22 community health centers (CHCs). CHCs are located in underserved areas, often ethnically and racially diverse communities, and provide services to low-income residents. Staff often are hired from the surrounding community, and generally represent racially and ethnically diverse groups. The selection of the CHCs as worksites in this study offers several other important perspectives. First, evaluation of health promotion programs implemented in these public sector worksites represents an important new initiative for worksite intervention research. Although 15% of the American labor force works in government, few health promotion programs have been evaluated in these worksites (US Small Business Administration, 1984). Second, these worksites are generally small; most employ less than 120 persons. Although an increasing number of worksites offer health promotion programming, such activities are least common in small worksites (Fielding and Piserchia, 1989). Small worksites are an especially important target, since they employ females, Latinos and those with low levels of education in greater proportions than do larger businesses (US Small Business Administration, 1984).

The 22 CHCs recruited to this study are located in eastern Massachusetts; 17 of the 22 sites are in the greater Boston metropolitan area. At baseline, these worksites employed between 27 and 640 workers; 20 of the 22 sites employed fewer than 120 workers. We stratified the CHCs into blocks based on size and ethnic composition, and randomized by block to achieve balance in size and ethnicity across intervention conditions.
The Treatwell 5-a-Day theoretical model

The theoretical model for this project responds to the two key challenges described above. To assure that the intervention addresses the concerns of the CHC’s ethnically diverse employee population, Treatwell 5-a-Day relies on community organization strategies for ensuring worker participation in the design and implementation of the intervention. Treatwell 5-a-Day is also based on a socio-ecological model that recognizes that individual behaviors respond to multiple levels of influence, including intrapersonal factors, interpersonal processes, organizational structures and community norms (Bronfenbrenner, 1979; McLeroy et al., 1988; Green et al., 1996; Stokols, 1996). In this way, the intervention aims to build support for behavior change from co-workers, household members and the worksite environment. As shown
<table>
<thead>
<tr>
<th>Level of influence</th>
<th>Intervention targets</th>
<th>Theoretical models</th>
<th>Secondary hypotheses</th>
<th>Measures</th>
</tr>
</thead>
</table>
| Intrapersonal     | Worker               | • Transtheoretical stages of change  
• Social cognitive theory  
• Health belief model | • Higher readiness to change is associated with increased fruit and vegetable consumption  
• Higher self-efficacy vis-à-vis dietary change is associated with increased fruit and vegetable consumption.  
• Knowledge of the diet-cancer link is associated with increased fruit and vegetable consumption. | • Readiness for change  
• Self efficacy  
• Knowledge |
| Interpersonal     | Family Co-workers    | • Social support  
• Social networks and ties  
• Social cognitive theory | • High family and co-worker support for dietary change is associated with increased fruit and vegetable consumption  
• High family support for dietary change is associated with increased availability of fruits and vegetables in the home  
• The type of family and the nature of the family ties will influence the strength of the relationships of family support to change in eating habits. | • Family support  
• Co-worker support  
• Social norms  
• Availability of fruits and vegetables in the home  
• Type of family ties |
| Organizational    | Worksite             | • Organizational change and development  
• Diffusion of innovation  
• Social marketing | • Worksite mean increases in fruit and vegetable consumption will be greatest where: fruits and vegetables are most available, and a catering policy supports purchase of healthy foods  
• Program implementation and participation will be highest where effective communication channels exist, effective change agents are identified and adequate resources are provided  
• Co-worker support for dietary changes will be highest in worksites with high co-worker cohesion and positive labor-management relations. | • Worksite characteristics |
| Community         | Media Grocery store (national campaign) | • Diffusion of innovation  
• Social marketing | • Workers reporting awareness of the national campaign are more likely to increase consumption of fruits and vegetables  
• Workers reporting participating in grocery store programs are more likely to report increased consumption of fruits and vegetables | • Awareness of grocery store campaign  
• Participation in grocery store campaign |

Fig. 2. Theoretical rationale and secondary hypotheses used in Treatwell 5-a-day.
in Figure 2, at each level of influence, the Treatwell 5-a-Day intervention and research questions are guided by theoretical models appropriate to each level and directed toward secondary hypotheses specific to that level.

On the intrapersonal level, the Treatwell 5-a-Day intervention model integrates principles from Social Cognitive Theory and the Transtheoretical Stages of Change model. Drawing on principles of Social Cognitive Theory (Bandura, 1977, 1986; Abrams et al., 1986), the Treatwell program provides opportunities for participants to observe role models for behavior change and develop self-efficacy through skill-building classes that include taste tests and cooking demonstrations. Incentives such as contests and prizes are utilized to increase the likelihood of worker participation in programs and to motivate behavior change. The Transtheoretical Stages of Change model (Prochaska et al., 1988; DiClemente et al., 1991) describes five stages denoting readiness for behavior change: precontemplation, contemplation, preparation, action and maintenance/relapse. The goals of Treatwell 5-a-Day include motivating workers to progress from one stage to another to produce lasting behavior change (Glanz et al., 1994; Green et al., 1994). Intervention strategies have been designed to target persons in every stage of change. In addition, intervention strategies correspond to the processes of change, which are likely to vary across stages.

In Treatwell 5-a-Day, we utilize sources of support valued by workers, i.e. co-workers and families that represent the interpersonal sphere of influence (Berkman and Syme, 1979; Gore, 1981; House, 1981; Gore, 1985; Jacobsen, 1986). Treatwell 5-a-Day is designed to mobilize four broad types of social support to encourage healthier food choices in both the Worksite and Worksite Plus Family conditions (House, 1981). Emotional support involves providing empathy and caring by co-workers and families. It has the strongest relationship to health status, in part through its influence on health behavior. Instrumental support includes tangible aid and services, provided through health programs to workers. Informational support is the provision of advice, suggestions and information, and is provided through educational materials and activities. Appraisal support involves the provision of information useful for self-evaluation purposes, such as feedback, affirmation and social comparison; here, appraisal support is provided through the use of dietary self-assessments with feedback, incentives for participation and reaching goals, and group discussions (Israel and Schurman, 1990).

The literatures on the diffusion of innovations (Rogers, 1983; Murray, 1986; Parcel et al., 1989) and community organization (Rothman, 1970; Carlaw et al., 1984) guide our interventions and related secondary hypotheses at the organizational and community levels. Community organization approaches are based on the principle that people are more likely to participate in activities when they are involved in planning and implementation. Participation fosters a sense of ‘ownership’ and builds skills for program implementation beyond the period of external funding and support, of particular importance in this ethnically diverse audience (Eriksen, 1988; Goodman and Steckler, 1990; Minkler, 1990). Community organization strategies are operationalized through a worksite coordinator and employee advisory board (EAB) in each site. These employee representatives work with project staff to plan and implement interventions.

Because worker participation is a basic component of the intervention model, the intervention protocol incorporates a balance between standardized interventions that provide consistency across worksites and tailoring of the intervention through interventions initiated by EABs and workers. We specified 13 educational components that were included in the required core interventions and were also incorporated into employee-initiated interventions. These educational components included behavior change strategies such as self-assessments and trial behaviors.

The Treatwell 5-a-Day intervention

As shown in Figure 1, the three intervention groups have overlapping components. The intervention
provided to the Minimal Intervention group is provided to the other two groups as well and the basic intervention offered in the Worksit
Intervention is provided to the Worksit Plus Family Intervention. In this way, we are able to test the addition of program components to the
basic model. For each intervention activity, we have defined measurable process objectives, which will be monitored through the process tracking
system.

For all intervention conditions
Three interventions have been specified for all intervention conditions, including periodic expo-
sure to the national 5-A-Day media campaigns and promotion of the Cancer Information Service (CIS)
hotline. In addition, project staff provided a 1 h
general nutrition presentation and taste test at the
worksites to ensure the cooperation of all worksites
throughout the study period.

For the Worksit and Worksit Plus Family
intervention conditions
In addition to the interventions described for all
intervention conditions, the theoretical model
described above is operationalized by focusing on
three core elements provided for the Worksit Intervention group and Worksit Plus Family Inter-
vention groups: (1) worker participation, (2) pro-
grams aimed at individual behavior change and
(3) programs aimed at changes in the worksite
environment. Because information on fruits and
vegetables is presented within the context of the
total diet, secondary goals include a decreased fat
consumption and an increased fiber consumption.

The channels for worker participation include a
worksite coordinator and an EAB at each worksite.
The worksite coordinator serves as the primary
contact between the project and the CHCs. The
EAB provides direction for nutrition education
efforts, fosters worker ownership of programs,
provides feedback to project staff, tailors programs
to the needs and interests of each worksite, and
assists in program implementation (Sorensen et al.,
1992). The EAB also helps tailor the program to
meet the needs of the ethnic groups represented at
their CHC. These EABs range in size from three
to 16 employees (median of nine employees). Most
meet monthly.

The core interventions aimed at individual
behavior change include: (1) a kickoff event, (2)
the EatWell 5-a-Day discussion series and (3) and
at least one educational campaign each intervention
year. EABs initiate other educational activities as
appropriate for their particular CHCs. Project staff
worked with EABs to plan kickoffs to build
awareness of the project and its activities, and
motivate employees to increase their consumption
of fruits and vegetables. The kickoffs were festive
events that included announcements of coming
activities, quizzes, prize drawings, educational
materials, and taste tests of fruit and vegetable
salads. Participation rates varied from 20% in one
of the large sites to 90% with an average of 63%
of the total employee population.

The EatWell 5-a-Day series consists of 10 half-
hour sessions that provide information employees
need to purchase and prepare healthful meals. The
EatWell sessions incorporate principles of adult
learning by encouraging discussion and providing
opportunities to try desired behaviors through taste
testing (Bandura, 1986; Knowles, 1978; Johnson
and Johnson, 1985). A 1.5 day training was pro-
vided for CHC dieticians and other consulting
dieticians who teach the program, to assure pro-
gram standardization. Educational campaigns are
orchestrated sets of nutrition education activities
arranged around a theme that lasted for 3–5 weeks.
Campaigns include recipe contests, holiday celeb-
rations and other activities which promote the
Treatwell 5-a-Day messages.

Following the ecological model, environmental
changes are implemented along with direct educa-
tion to build a motivational climate for initiating
and maintaining changes (Abrams et al., 1986;
Sorensen et al., 1995). Consultation is provided to
encourage CHCs to increase their offerings of
fruits and vegetables in vending machines, at
special occasion meals and snacks, and in break
rooms (Glanz and Mullis, 1988; Mayer et al.,
1899). In addition, interventions are offered to
stimulate and support individual behavior change
through environmental interventions such as point-of-choice labeling of fruits and vegetables, and posters, videos and brochures placed where employees eat. Such an environment provides increased opportunities for employees to learn to make improved food choices, reduces barriers to behavior change and provides daily exposure to the Treatwell 5-a-Day messages, thus promoting a social norm of healthy eating. Collaborations with the food industry provide products for taste testing and enhance the potential for long-term support for CHCs nutrition education activities.

For the Worksite Plus Family intervention condition

In addition to the components offered in the Worksite Intervention group, the following components are added in the Worksite Plus Family condition: (1) a learn-at-home program, ‘Fit in 5’, (2) an annual family newsletter, (3) an annual family festival and (4) periodic mailings of materials to families. In addition, EABs in this condition are encouraged to identify other family-focused interventions appropriate for their CHC. Families take many forms; materials and activities are directed to families with adults only, families with children, single parent families and families that include multiple adults. The family-focused interventions are designed to create a home environment supportive of the workers’ attempts to change eating patterns, while also encouraging family members to increase consumption of fruits and vegetables.

‘Fit in 5’ is designed as a five-part series that is distributed through the worksite, and returned to investigators and staff at the University of Massachusetts Extension for comments, incentives and documentation. Prior studies have found that home learning may be an effective method to incorporate family support in nutrition education (Kolasca et al., 1979), and may contribute to improvements in nutrition knowledge, attitudes and practices (Gillespie et al., 1983; Perry et al., 1988). This five-lesson correspondence program is designed to increase family interaction around food. Participation of family members in meal planning, food shopping, preparation, discussions about food and nutrition, and feedback with regard to recipes and taste tests is encouraged. Activities that the family can perform together, such as puzzles and recipe preparation, are included. ‘Fit in 5’ is designed to be of interest to the various cultural and ethnic groups represented at the worksites; each lesson features a different ethnic group and family lifestyle.

The Family Newsletter is sent once a year to all CHC employees in the Worksite Plus Family condition. This newsletter contains information, practical tips, a questions and answers section, recipes with instructions for preparation with the family, games, and a coupon from a local grocer towards the purchase of fruits and vegetables, as well as a prize drawing. Additional educational materials are sent periodically to families.

Family festivals are incorporated into established CHC events such as family holiday parties and picnics. These festivals include educational activities suited to employees at various stages of readiness to change eating behavior, such as educational materials, games, contests, taste tests and a children’s entertainer.

Assessment

A survey was designed to assess attitudes and practices related to the intervention objectives. This survey was administered at baseline prior to the randomization of worksites to condition, to assess baseline characteristics of the employees and will be administered again at the conclusion of the intervention period to assess intervention effectiveness. Analyses of the baseline data were conducted to assess differences in eating patterns by ethnicity, and the potential role of co-worker and family support in changing workers’ eating patterns.

Measures

The survey was designed to assess dietary patterns, social support and demographic characteristics.

Dietary patterns

Fruit and vegetable intake were measured using a seven-item screener. This screener was developed
for use in the nine 5-a-Day research projects, based on the national 5-a-Day survey (Subar et al., 1995) and the other fruit and vegetable screeners (Serdula et al., 1993, 1995; Krebs-Smith et al., 1995). We calculated the number of servings of fruits and vegetables per day for each subject, and then categorized each subject as consuming five or more servings per day or less than five per day.

Worksite and household support for healthy eating

Co-worker and household support for healthy eating were each measured by eight items using a four-point scale. The resulting scores ranged from 1 (never received any of the support items) to 4 (often received the support items).

Demographic characteristics

These were assessed using standard items, and included sex, age, race/ethnicity, education and income. Job categories were based on usual occupational categories in the CHCs. Living with a spouse or partner as well as with other adults or children was also determined.

Data collection

The survey was administered prior to the beginning of the intervention between May and August, 1994, to a census of workers in 20 sites employing 120 or fewer workers and to a random sample of 100 employees in the two larger sites. Eligible employees were permanent employees working at least 15 h per week. The self-administered survey was distributed to 1588 eligible employees. The survey was conducted on-site during work time in 14 sites; in the eight remaining sites, the survey was distributed through internal worksite distribution channels. The response rates ranged from 68 to 100%, with an average response rate across the 22 sites of 87%, resulting in a sample size of 1359 completed surveys.

Data analysis

The unit of enrollment and randomization for this study was the health center, while the unit of assessment was the employee. The analysis was computed taking into consideration this clustering of employees in worksites. For the categorical variable, consumption of five or more servings of fruits and vegetables per day, we estimated the generalized linear mixed model using the iterative reweighed maximum likelihood method (Schall, 1991; Wolfinger, 1993), with worksite included as a random effect. We evaluated bivariate associations of the subject characteristics and support measures with fruit and vegetable consumption, controlling for worksite.

We computed a multiple logistic regression analysis to investigate the association of fruit and vegetable consumption with worker characteristics including household and co-worker support. We computed a complete model with all variables that were significantly associated with fruit and vegetable consumption in bivariate analyses. To obtain the most parsimonious model, we removed from the model characteristics that were not statistically significant in multivariate analysis. We report adjusted odds ratios from the final model for fruit and vegetable consumption, including co-worker support for all cases and household support for subjects not living alone.

Results

Characteristics of the sample

The characteristics of this sample are shown in Table I. Women represented the large majority of this group. Close to half of the workers are between 35 and 49 years of age. The sample was ethnically and racially diverse. Multiple educational levels are also represented in this sample, reflecting the diversity of occupations represented. Forty percent of these workers earn less than $30 000 per year. The majority live with other adults. Only about 17% are current cigarette smokers. The median intake was 3.1 servings of fruits and vegetables per day. Only 22.7% of the sample consumed five servings a day or more.

Eating patterns and worker characteristics

Table II presents the bivariate associations between the proportion of respondents who eat at least five servings of fruits and vegetables per day and
Table I. Selected characteristics of study sample, Treatwell 5-a-Day baseline survey

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<th>Characteristic</th>
<th>Number</th>
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<td></td>
</tr>
<tr>
<td>men</td>
<td>212</td>
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</tr>
<tr>
<td>women</td>
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<tr>
<td>Age (years)</td>
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<tr>
<td>&lt;35</td>
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<td>35–49</td>
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</tbody>
</table>

worker characteristics. The proportion of subjects consuming five or more servings of fruits and vegetables per day was significantly and directly associated with education, was lower in smokers, and higher among professionals. The proportion of subjects who eat five or more servings of fruits and vegetables per day was not significantly associated with age, sex, ethnicity, income, or whether the subject lived with adults or with a spouse or partner. Consumption of fruits and vegetables was not significantly associated with co-worker support for eating a healthy diet nor with household support among those not living alone.

We conducted a multiple logistic regression analysis to investigate the association of the two support variables with fruit and vegetable con-

Table II. Odds ratios for eating five servings or more of fruits and vegetables per day, Treatwell 5-a-Day baseline survey

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Odds ratio</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1.09</td>
<td>0.64</td>
</tr>
<tr>
<td>women</td>
<td>1.09</td>
<td>0.61</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;35</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>35–49</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>50+</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>1.37</td>
<td></td>
</tr>
<tr>
<td>White and other</td>
<td>1.26</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>high school or less</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>post-HS training</td>
<td>1.72</td>
<td></td>
</tr>
<tr>
<td>baccalaureate</td>
<td>2.22</td>
<td></td>
</tr>
<tr>
<td>post-BA training</td>
<td>2.10</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>service/clerical</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>para-professional</td>
<td>1.31</td>
<td></td>
</tr>
<tr>
<td>professional</td>
<td>1.74</td>
<td></td>
</tr>
<tr>
<td>managerial</td>
<td>1.04</td>
<td></td>
</tr>
<tr>
<td>Income ($)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;30 000</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>30 000–49 999</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>50 000–69 999</td>
<td>1.39</td>
<td></td>
</tr>
<tr>
<td>70–000+</td>
<td>1.31</td>
<td></td>
</tr>
<tr>
<td>Live with adults</td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td>Live with spouse or partner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td>Co-worker support</td>
<td>1.02</td>
<td>0.22</td>
</tr>
<tr>
<td>Household support</td>
<td>1.02</td>
<td>0.10</td>
</tr>
<tr>
<td>Smoking status</td>
<td></td>
<td>0.002</td>
</tr>
<tr>
<td>smokers</td>
<td>0.52</td>
<td></td>
</tr>
</tbody>
</table>

a Workers who do not live alone.
Table III. Multivariate odds ratios for eating five or more servings of fruits and vegetables per day, Treatwell 5-a-Day baseline survey

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Odds ratio</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All cases (n = 1135)</td>
<td></td>
<td>0.03</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>high school or less</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>post-HS training</td>
<td>1.52</td>
<td></td>
</tr>
<tr>
<td>baccalaureate</td>
<td>1.98</td>
<td></td>
</tr>
<tr>
<td>post-BA training</td>
<td>1.90</td>
<td></td>
</tr>
<tr>
<td>Co-worker support</td>
<td>1.03</td>
<td>0.13</td>
</tr>
<tr>
<td>Smoking status</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td>smokers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjects who do not live alone (n = 939)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td>0.04</td>
</tr>
<tr>
<td>women</td>
<td>1.67</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td>0.001</td>
</tr>
<tr>
<td>high school or less</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>post-HS training</td>
<td>1.79</td>
<td></td>
</tr>
<tr>
<td>baccalaureate</td>
<td>2.87</td>
<td></td>
</tr>
<tr>
<td>post-BA training</td>
<td>2.49</td>
<td></td>
</tr>
<tr>
<td>Household support</td>
<td>1.03</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Smoking status, controlling for possible confounders. We initially included age, smoking status, sex, race/ethnicity, education, income and occupation in multiple logistic regression analyses of servings of fruits and vegetables and each of the support measures. Variables not significant in the multivariable analyses were then excluded, to obtain the most parsimonious model possible (see Table III). In the model that included all workers and co-worker support, the association between fruit and vegetable consumption and co-worker support remained non-significant. Occupation was no longer associated with fruit and vegetable consumption when smoking status and education were controlled in the analysis. Smoking status and education continued to be significantly related to fruit and vegetable consumption.

Among the subset of subjects who did not live alone, the strength of the association between fruit and vegetable consumption and household support, as measured by the odds ratio, did not change when sex and education were controlled. Neither smoking nor occupation were associated with fruit and vegetable consumption in this multivariable analysis. Sex and education remained significantly associated with fruit and vegetable consumption.

Discussion

This paper describes an intervention study designed to respond to two important challenges to worksite health promotion. First, there is a need for assuring that worksite programs are embedded in the larger social context of health behaviors, including the family. The Treatwell 5-a-Day project adds a component not previously studied in worksite-based interventions: a family-focused intervention designed to enhance the impact of a worksite intervention. Second, worksite health promotion programs must respond to the increasing ethnic diversity of the US population and the varying cultural patterns likely to influence dietary habits. In the health centers participating in this study, nearly half of the workforce is non-white or Latino.

Results of the baseline survey of workers in the 22 community health centers participating in this study indicate that consumption of the recommended number of servings of fruits and vegetables is still far from the recommended levels, even among those working in the health care field. Less than one-quarter of respondents to the Treatwell 5-a-Day baseline survey reported consuming five or more servings of fruits and vegetables a day. This low level of consumption held across ethnic groups and is similar to that reported by other investigators (Serdula et al., 1995; Subar et al., 1995). As reported by others, we also found that fruit and vegetable consumption was associated with greater education, female gender and non-smoking (Cronin et al., 1982; Popkin et al., 1989; Thompson et al., 1992; Hunt et al., 1993; Subar et al., 1994). These findings point to the importance of nutrition interventions designed for workers with less education and who are men or smokers.

Household support for healthy eating patterns has been reported by others to be an important factor in dietary change (Baranowski and Nader, 1985; McCann et al., 1990). The family in its various forms provides a primary social learning environment for its members. The clustering of a
number of behavioral characteristics in families further attests to the importance of the addition of the family focus in this intervention (Sallis and Nader, 1988; Sallis et al., 1988). Nonetheless, in this cross-sectional study, household support was not significantly associated with fruit and vegetable consumption. In this study, in which one component of the intervention is aimed at enhancing household support for healthy eating, results will shed light on the potential relationship between increasing household support and dietary improvements.

Despite its potential for influencing behavior change, the addition of the family-focus to a worksite intervention presents crucial challenges. First, families of employed adults have an array of competing demands on their time. ‘Fit in 5’ was designed as an easy and accessible method for involving family members in learning activities, cooking and shopping. Although this program can be completed at home on a flexible schedule, these working adults often have limited time for additional study at home. Preliminary recruitment rates to ‘Fit in 5’ have been low, despite the use of incentives. Nonetheless, for those families completing the modules, initial feedback has indicated that this method has been useful in involving family members.

A second barrier to involving families in worksite interventions is the diversity in family structure, cultural patterns and education. Families in the US today include increasing numbers of households with stepfamilies (Larson, 1992), members over age 35 (Exter, 1992), married couples with no children and women living alone (Ambry, 1992). In this study population, 15% of employees reported living alone, 7% reported living with children only and 79% reported living with adults with or without children; 27% reported that they did not live with a spouse or partner. Different approaches and strategies are needed for optimum impact with each of these family types. To accommodate different family types, interventions are designed to allow participants to adapt the content to their own lifestyle patterns. The EABs have provided an additional vehicle for identifying other methods of involving families that may be most effective for workers at their health center.

This study population also represented diverse ethnic backgrounds, and included 52% White, non-Latino; 18% Black, non-Latino; and 23% Latino. Within each of these ethnic groups, multiple cultures are represented. For example, Latinos include Dominican, Puerto Rican and Central American groups; Blacks include African-American, Cape Verdean and Haitian groups; and Whites include those of Italian, Portuguese and Irish descent. Recipes and foods included in all educational programs represented foods commonly used by different cultural groups. In addition, educational materials have been adapted for multiple reading levels in order to accommodate the needs of workers of diverse educational and professional backgrounds.

Results of this study will provide valuable new information about the potential efficacy of involving families in worksite-based interventions promoting healthy diets. It is possible that the gender of employees may interact with the effectiveness of this intervention, particularly in households where traditional gender roles provide the basis for the division of labor. Conceivably, men who are not responsible for food purchases and preparation may derive important benefits from a family-focused intervention that builds household support for healthy eating habits. Conversely, a family-focused intervention may provide useful support for women who are the primary decision makers about family eating habits. Unfortunately, it is beyond the scope of this study to assess intervention-related changes in the eating habit of household members, although a supplementary study is assessing the correlation of spousal eating habits (Macario and Sorensen, in press).

Treatwell 5-a-Day is beginning to address several important challenges for worksite health promotion. The incorporation of a family-focused intervention into a state-of-the-art worksite intervention provides an important new emphasis, especially in light of the association of household support to individual eating habits. This study is also likely to make important strides in our
understanding of the design and delivery of nutrition education to an ethnically diverse workforce, and identification of strategies for enhancing co-worker support for behavior change. The likelihood of effecting change in the targeted dietary patterns is enhanced by engaging the family in this intervention, thereby embedding this intervention in the broader social context of health behaviors.

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Treatwell 5-a-Day


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