The Transtheoretical Model Targeting Dietary Fat, Exercise, and Smoking in a University Health Clinic

J. KEMP ELLINGTON
North Carolina State University

DENISE M. MARTZ*
Appalachian State University

A physician-based health promotion intervention based on the transtheoretical stages of change model using a 2-group, pretest–posttest experimental design targeted patients' (N = 165) dietary fat, exercise, and smoking behaviors in a university health clinic. The control group received usual care, whereas the experimental group received behavior-change worksheets, and their physician endorsed the strategies in the worksheets during their office visit. Although participants failed to show any forward movement in the stages of change on these health behaviors, post hoc analyses found that completion of the worksheets and receiving the physician's endorsement made a difference in participants' self-reported impact of the intervention.

Over 65% of the leading causes of death and disability are attributable to lifestyle behavior (U.S. Department of Health & Human Services [USDHHS], 1990). Cigarette smoking is the most preventable cause of mortality (U.S. Preventive Services Task Force [USPSTF], 1989). Although 70% of smokers visit a physician each year, most smokers are not advised or assisted in an attempt to quit (Centers for Disease Control and Prevention, 1993). Research suggests that advice from doctors, even as brief as a 1-min counseling session, during routine care increases the quit rate among smokers (Silagy, 2000; U.S. Public Health Service Report, 2000). Similarly, exercise prevents hypertension, type II diabetes, osteoporosis, obesity, and stress-related psychological problems (Harris, Caspersen, DeFriese, & Estes, 1989); yet, it is the most underutilized preventive health behavior, with 40% of the population getting insufficient exercise and 25% getting none at all (USDHHS, 1996). Physicians offer counseling for physical activity in only 19% of office visits (Centers for Disease Control [CDC], 1998), which is unfortunate, because 85% of patients report physician-based counseling would help them (Harris et al., 1989). Furthermore, excessive consumption of high-fat foods, instead of high-fiber foods, contributes to the development of cardiovascular disease and some forms of cancer (Kottke, Battista, DeFriese, & Brekke, 1988). Most physicians are not addressing dietary change in a comprehensive and effective manner, and they report counseling for nutrition in only 23% of office visits (CDC, 1998; Glanz, Tziraki, Albright, & Fernandes, 1995; Levine et al., 1993). A patient's medical history should incorporate nutrition assessment and the techniques used to assist patients in behavior-change need development (Hark & Deen, 1999; Zimmerman, Olsen, & Bosworth, 2000).

The USPSTF and the American Heart Association recommend that all primary care providers offer

Author note. J. Kemp Ellington, BS, completed this research in partial fulfillment of an honors degree in psychology from Appalachian State University, Boone, North Carolina. He is currently a master's candidate in industrial/organizational psychology at North Carolina State University. Denise M. Martz, PhD, associate professor, Department of Psychology, Appalachian State University, served as honors thesis chair.

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Correspondence concerning this article should be addressed to Denise M. Martz, PhD, Department of Psychology, Appalachian State University, Boone, NC 28608. Telephone: (828) 262-2715. E-mail: martzdm@appstate.edu.

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TABLE 1

Description of the Transtheoretical Model's Stages of Change

Stage of change	Explanation	Example
Precontemplation	Never considered making the change	Smoker who's never thought of quitting
Contemplation	Considered change, but not preparing	Thought about eating less fast food, but still eating hamburgers and fries for lunches
Preparation	Making initial changes	Smoker who has purchased nicotine replacement gum, but has not used it
Action	Attempting behavior change	Has begun an exercise routine
Maintenance	Consistently maintained healthy behavior over the past six months	Always eats low-fat, high-fiber meals and exercises three times a week

their patients counseling to promote physical activity, a healthy diet, and smoking cessation as part of the preventive health exam (Grundy et al., 1997; USPSTF, 1996). Because 77% of Americans visit their doctor each year, primary care physicians could help them make healthy lifestyle modifications (USDHHS, 1990). Less than 10% of physicians surveyed thought they could be "very successful" in modifying patients' health behavior (Yeager et al., 1996). Furthermore, when physicians did offer counseling, they relied more on generic health education techniques and failed to use effective behavior modification strategies (Orleans, George, Houpt, & Brodie, 1985). Thus, multiple barriers keep physicians from intervening on patients' health behaviors: (a) lack of reimbursement for preventive counseling, (b) lack of training in counseling strategies, (c) lack of understanding of the psychology of change, and (d) lack of cost-effective, comprehensive interventions. Consequently, a major gap exists between the goal of using primary care physicians as health promotion resources, and program development to make this goal feasible. This research represents an attempt to bridge the gap by developing a lifestyle modification program based on a proven model of behavior change.

Transtheoretical Model of Health Behavior Change

The transtheoretical stages of change model suggests people begin in a precontemplation stage and then, depending on the circumstances, may progress though contemplation, preparation, action, and maintenance stages (Prochaska, DiClemente, & Norcross, 1992; see Table 1 for a description of each of these stages). Many Americans have not achieved maintenance on healthy nutrition, exercise, or smoking cessation. Instead, they remain stagnant in precontemplation through action stages due to the absence of education, motivation, and behavior modification strategies. The transtheoretical model translates successfully for numerous health behaviors (Nigg et al., 1999), and interventions that are appropriately matched are significantly more successful than mismatched interventions (Ershoff, Mullen, & Quinn, 1987; Ockene, Ockene, & Kristellar, 1988). Because Americans visit their physicians 5.3 times per year (Long et al., 1996), these visits would allow for physician-based health promotion in graded stages over time (Zimmerman et al., 2000). In fact, several interventions based on the transtheoretical model have effectively targeted single health behaviors in primary care settings (Block, Clifford, Naughton, Henderson, & McAdams, 1989; Block, Dresser, Hartman, & Carroll, 1985; Campbell et al., 1994; Cohen et al., 1989; Long et al., 1996; Ockene et al., 1996; USDHHS, 1990).

The purpose of this research was to develop, implement, and evaluate a physician-based health promotion intervention to help individuals change critical health behaviors. The present research was

the first study to target multiple health behaviors (i.e., dietary fat, exercise, and smoking) using the transtheoretical model of behavior change in a primary care environment.

Method

Participants

We recruited 236 patients from the waiting room of the health clinic at a midsized southeastern university and obtained 165 participants (n = 89 experimental and n = 76 control; 71 data sets were incomplete due to an inability to contact the patients at posttest). All participants completed informed consent forms. We randomly assigned participants to a control condition (treatment as usual) or an experimental condition in which they completed stage-appropriate worksheets on dietary fat, exercise, and smoking (if applicable). Additionally, we prompted their physician or nurse practitioner, via a self-stick note on top of their chart, to endorse the strategies in the worksheets. Furthermore, we randomly assigned participants to either a 1-week or 4-week posttest condition to evaluate a potential latency effect of the intervention.

Materials

Primary Care–Stages of Change Scale. Prior to their office visit, participants completed the Primary Care–Stages of Change Scale (PC-SOCS), a 17-item ordinal scale developed for screening purposes that contains an algorithm in a step-function format that places individuals in their current transtheoretical stage for nutrition (dietary fat), exercise, and smoking (Mungle & Martz, 1999). Answering an item either renders a stage "diagnosis" or leads to more in-depth questions until all five stages are determined for each health behavior. We adapted, with altered wording and arrangement, the algorithm assessing readiness for change in dietary fat from a previously used scale (Curry, Kristal, & Bowen, 1992). We also developed the components assessing readiness for change on exercise and smoking based on previously used algorithms (Prochaska et al., 1994; Velicer, Prochaska, Rossi, & Snow, 1992). We assessed construct validity of the PC-SOCS by comparing stages of change for nutrition, exercise, and smoking with alternative measures of these behaviors (Mungle & Martz, 1999). We correlated nutrition stages with a fat frequency questionnaire (r = –.47), exercise stages with calories expended per week (r = .78), and smoking stages with the number of cigarettes smoked per day (r = –.89).

Structured telephone interview. At either 1 or 4 weeks after their original health clinic office visit, we contacted participants for a posttest telephone interview that included the PC-SOCS and asked participants in a "yes" or "no" fashion whether the intervention had an impact on any of the health behaviors. To enhance accuracy of reporting, we used a "bogus pipeline technique" whereby we asked participants to state the name and telephone number of another person who could verify their cigarette use, if applicable (Velicer et al., 1992). We also asked several manipulation check questions: (a) if they remembered completing worksheets related to dietary fat, exercise, and smoking (worksheet variable), (b) what became of these worksheets, and (c) if they recalled their clinician endorsing healthy changes in dietary fat, exercise, and smoking during their office visit (MD variable).

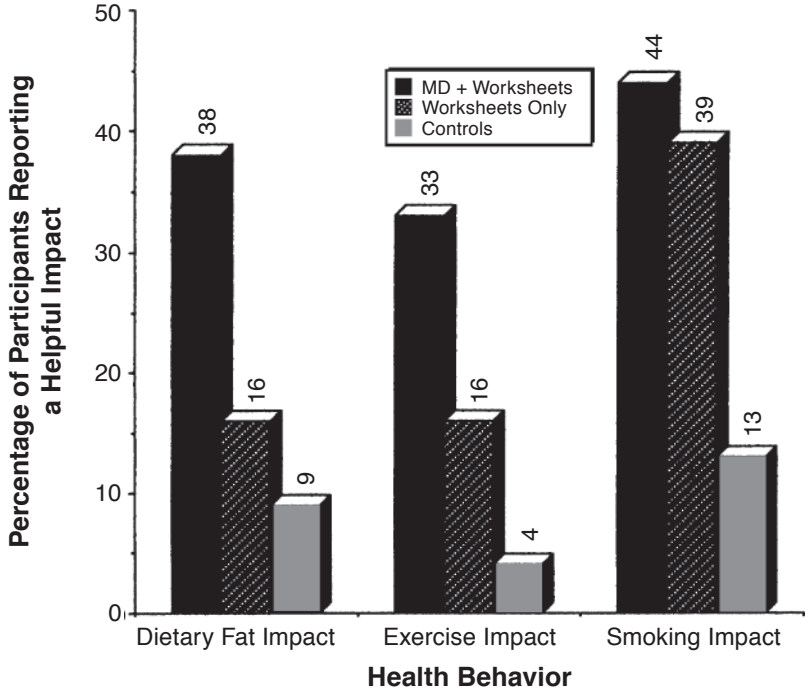
Stage-appropriate worksheets. We developed a two-sided, color-coded worksheet for each of the five transtheoretical stages for the three targeted health behaviors. We created the exercise worksheets, derived partially from the Physician-Based Assessment and Counseling for Exercise (PACE) program (DiClemente et al., 1991), and smoking/dietary fat worksheets specifically for this intervention to aid patients' progression through stages by intervening on critical behavioral variables pertinent to each stage. These worksheets combined educational information, behavior modification strategies, and relapse prevention as appropriate based on recommendations from the transtheoretical model (Prochaska et al., 1992).

Procedure

Office visit experimental protocol. During a 3-month period in the fall semester, research assistants (RAs) invited patients entering the health clinic's waiting area to participate. Upon consent, participants completed the PC-SOCS and returned it to the RA, who quickly classified participants by stage for dietary fat, exercise, and smoking, and then assigned them to experimental or control conditions through an alternating, counterbalancing technique. Control participants received care as usual. The RA instructed experimental participants to read and complete three color-coded worksheets tailored to their stages prior to the medical exam. We notified physicians of patients in the experimental group with a self-stick note on top of these patients' charts. At a weekly staff meeting prior to commencement of the study, the clinic's office manager gave physicians a list of instructions that suggested they: (a) acknowledge patients' participation, (b) enthusiastically endorse the behavior-change techniques in the worksheets, (c) encourage completion of the worksheets, and (d) state how important limiting

FIGURE 1

Percentage of participants' self-reported impact on the three targeted health behaviors in those who received physician endorsement plus worksheets versus those with worksheets only versus controls.



dietary fat, regular exercise, and smoking cessation are for one's health and well-being.

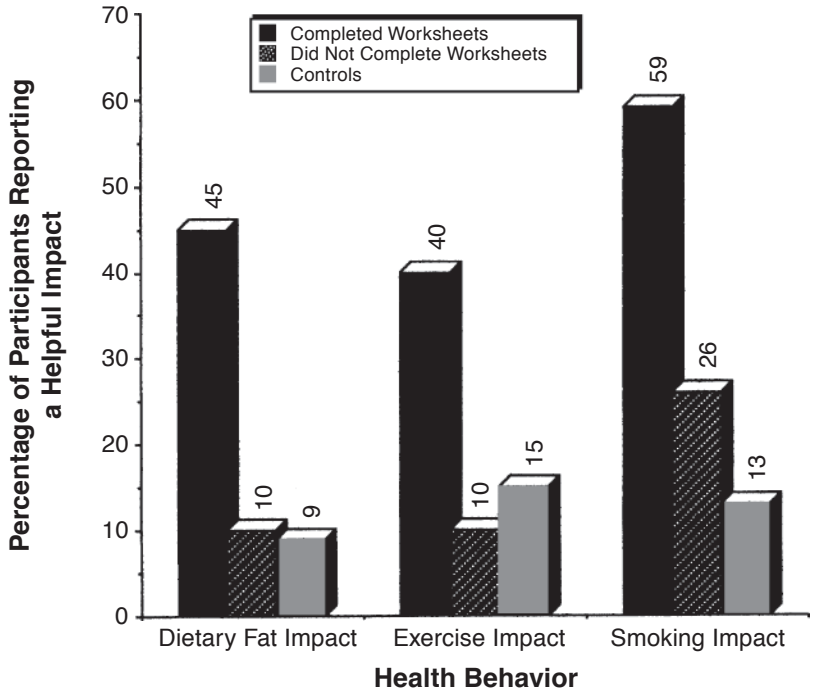
Outcome evaluation. At either 1 or 4 weeks after their original office visit, RAs contacted participants, whose names were masked, by telephone during their preferred calling time and administered the 5-min structured telephone interview. These RAs asked participants if they recalled receiving the physician's endorsement. This answer determined the post hoc MD variable. We placed post hoc participants who said "yes" into the MD+worksheet group and participants who said "no" into the worksheet-only group. Additionally, participants in the experimental group were divided on the post hoc worksheet variable based on their answer concerning completion of worksheets. We placed participants who reported completion of worksheets in the completed-worksheet group and those participants who did not into the did-not-complete-worksheet group. We hypothesized that a dose-response effect would be found when comparing movement across the stages of change and self-reported impact (a) for participants who recalled receiving the physician's endorsement versus participants who did not and (b) for participants who completed worksheets versus participants who did not.

Results

We collected pretest data for 236 patients, but contacted only 165 participants for the structured telephone interview; therefore, we included these 165 participants in the study. At posttest, 94% of experimental participants recalled receiving behavior-change worksheets. When we asked if they completed the exercises in the worksheets, 47% of the experimental participants said "yes," and we placed them in the completed-worksheet group; 52.4% said "no," and we placed them in the did-not-complete-worksheet group. Of the experimental participants, 40 (45%) reported receiving their physician's endorsement, and we placed them in the post hoc MD+ worksheet group, whereas 49 (55%) did not recall this endorsement, and therefore we placed them in the worksheet-only group. No participants in the control group said "yes" concerning this endorsement.

FIGURE 2

Percentage of participants' self-reported impact on the three targeted health behaviors in those who completed worksheets versus those who did not complete worksheets versus controls.



Analyses for Forward Movement in Stages of Change

Contrary to our hypotheses, comparison of forward movement between the two groups with a Kruskal-Wallis nonparametric analysis of variance (ANOVA) revealed no significant differences for dietary fat, $H(1, 165) = 2.29$, $p > .05$, exercise, $H(1, 165) = 1.37$, $p > .05$, or smoking, $H(1, 165) = 1.83$, $p > .05$.

Analyses for Self-Reported Impact

Consistent with our hypotheses, comparison of self-reported impact of the intervention between the two groups revealed a significant difference in the expected direction for dietary fat, $H(1, 165) = 7.6$, $p < .01$, and a trend for smoking, $H(1, 165) = 3.2$, $p < .10$, but no difference for exercise, $H(1, 165) = 2.2$, $p > .05$.

Analyses of Post Hoc Variables

When we considered post hoc variables, a greater difference emerged for self-reported impact. As Figure 1 suggests, the MD+worksheet group reported significantly more impact on dietary fat compared to the worksheet-only group and then controls, $H(2, 165) = 11.3$, $p < .001$. We found a similar effect for impact on exercise, $H(2, 165) = 6.9$, $p < .001$. We calculated the analysis for smoking impact only on participants who reported smoking at the time of their office visit. This analysis also yielded a significant effect, mainly due to the contrast with controls, $\chi^2(1, 165) = 6.2$, $p < .05$. Hence, physicians' endorsement of the intervention appeared to have a noticeable impact.

Because all of the participants in the experimental condition did not report completion of the worksheets, it was important to ascertain if this behavior made a difference. As Figure 2 suggests, completion of worksheets and their behavior modification strategies led to a greater self-reported impact for dietary fat, $H(2, 165) = 6.3$, $p < .001$, and a trend for greater impact on exercise, $H(2, 165) = 5.8$, $p < .10$. Again, we analyzed smoking impact only for participants who reported smoking at the time of their office visit, and this produced a significant difference $\chi^2(1, 165) = 5.6$, $p < .05$.

Examination of Posttest Timing

Because RAs called half of the participants for posttesting at 1 week and the other half at 1 month after pretest (i.e., to assess for a possible latency effect), we examined forward movement through stages for dietary fat, exercise, and smoking between these two conditions. A Kruskal-Wallis one-way ANOVA revealed no differences for dietary fat, $H(1, 165) = .90$, $p > .05$, exercise, $H(1, 165) = .27$, $p > .05$, or smoking, $H(1, 165) = .19$, $p > .05$. Similarly, we found no significant difference between groups for self-reported impact for dietary fat, $H(1, 165) = 1.21$, $p > .05$, exercise, $H(1, 165) = .08$, $p > .05$, or smoking, $H(1, 165) = .001$, $p > .05$. These analyses suggest that timing of posttest interviews did not affect outcome.

Discussion

We conducted this research with the goal of helping individuals change critical health behaviors. Given the frequency that most individuals see their primary care providers, physicians may be powerful resources for preventive counseling. We can provide more effective counseling if we implement a program that will allow physicians and nurse practitioners to identify patients' readiness-for-change stage and tailor interventions appropriately to this stage. If we implemented this program successfully on a large scale, it might help reduce death and disability that result from lifestyle behaviors such as excessive dietary fat, inadequate exercise, and smoking.

The most important outcome assessed in this research was forward movement on the transtheoretical stages of change for the three targeted health behaviors. However, we failed to find these results because participants reported no stage advancement on any of the health behaviors. These results suggest that physician endorsement or completion of the behavior modification worksheets did not facilitate desired changes. Given the nature of the design and use of the newly developed PC-SOCS as this dependent variable, it is impossible to determine if the PC-SOCS, developed as a screening measure, is a poor measure of change or if participants truly failed to make behavioral changes on these health behaviors. Future research should include more sensitive dependent variables such as food, exercise, and smoking diaries at posttest to compare with dietary fat intake, calorie expenditure, and smoking tendencies between groups. Although accurate measurement of these health behaviors is a challenge for researchers, actual behavior change, rather than reported change, is the ultimate goal of such interventions.

Curiously, even though participants reported no advancement in stages on these health behaviors, effects did emerge for self-reported impact or helpfulness on individual components of the intervention. Physician endorsement yielded more participants who reported an impact for all three health behaviors. Similarly, comparing participants who completed the behavior modification worksheets to participants who did not complete them or controls who did not receive them also demonstrates enhanced self-reported impact on the three health behaviors.

One explanation for this inconsistency is that participation in the experimental group may have resulted in demand characteristics, whereby some participants may have thought it socially desirable to report an impact because their physician had made an effort. The PC-SOCS and questions asked in the telephone interview have clear face validity, and the purpose of the intervention was probably obvious to patients (i.e., to improve health behaviors); therefore, many participants may have been reporting to us what they knew we wanted to hear. Likewise, the self-justification of having completed the worksheets may have caused these participants to "think" it had a greater impact than it really did. Due to weaknesses in the research design, it is impossible to make conclusions about either of these possibilities.

An alternative explanation is that participants' self-reported impact is accurate. The intervention may have created cognitive or behavioral changes in these health behaviors that simply were not captured in a stage-change measure. Changes could have occurred within stages or across stages, but were missed completely by the PC-SOCS. Again, future research needs to include better behavioral outcome variables to remedy this problem. This study relied completely on self-report. Most educated individuals likely overestimate, in a self-serving bias, their adherence to such a lifestyle. In retrospect, we should have used more in-depth manipulation checks in order to monitor more closely physicians' endorsements, rather than relying on participants' recall at posttest. For instance, we might have used an interview directly following the medical exam such as the newly published Physician Exit Interview (Pbert et al., 1999) to identify what the physician actually said to the participants. This addition would have controlled for biases or errors in patients' recall and also would have served to create more accuracy in assessing a variable with some variance (i.e., physicians' endorsements likely vary in performance).

Finally, we would like to comment on the practicality of such interventions. Although staff members at this particular health center were quite cooperative, there were certain difficulties encountered in program implementation. Time became an issue,

because completion of the consent form and PC-SOCS sometimes delayed transit of patients from the waiting area to exam rooms. This problem concerned mostly nurses who were expected to expedite physicians' exams. One way a clinic could adapt to such program implementation would be to schedule all appointments 5–10 min prior to the expected medical exam. Future interventions also should aim to make the paperwork more efficient. RAs were always available during participant recruitment, and it is unlikely that a busy staff member could have easily assumed such a task.

In the past, various barriers have kept physicians from incorporating preventive interventions into their practices. Although this intervention did not address the problem of a lack of compensation for preventive counseling, it did propose potential solutions to some of the other barriers. For example, even though most physicians have not been trained extensively in counseling strategies, a simple endorsement still taps into their power of authority, a power that our study found to be significant. Furthermore, use of the PC-SOCS and the stage-appropriate worksheets allow for matching behavior-change strategies to participants' particular readiness for change. Physicians did not need to tailor their counseling intervention, because this message was inherent in the worksheets. A general endorsement could serve the same purpose for all patients and would be much easier to remember for physicians with time constraints. Ideally, physicians' endorsement would serve to motivate patients, and the worksheets would show patients how to change.

Although physician-based health promotion is still in its infancy, initial research is promising (Campbell et al., 1994; Long et al., 1996; Wechsler, Levine, Idelson, Rohman, & Taylor, 1983). In this particular study, not only did participants report an intervention impact, but most of the physicians were interested in providing preventive counseling. As long as there are primary care providers who are enthusiastic about implementing health promotion into their practices, then systematic evaluations of such programs will result in effective interventions in the near future. With its great potential to reduce death and disability for Americans, physician-based health promotion could be of primary importance in our country's future public health goals.

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