PLATO STAYWELL is a microcomputer program of health behavior change that focuses on the areas of smoking cessation, weight control, stress management, blood pressure management, and fitness behavior. The program is highly individualized, matches people to the program intervention most likely to be effective for them, and is modified while the person is in it as a function of their behavior change in the program. The efficacy of matching and reassignment is evaluated by a mathematical model that enables the program to make increasingly accurate decisions.

The program is patient, friendly and supportive, and provides graphic feedback of progress. Users receive only information relevant and useful to them, and have the opportunity to apply newly learned information in computer simulation situations.

Program Rationale

Control Data Corporation initiated a preventive medicine program focusing on cardiovascular behavioral risks in 1979. That program, called STAYWELL, screens employees for potential risks in the areas of smoking cessation, physical fitness, blood pressure management, cholesterol and salt consumption, weight control, and stress management. Employees interested in changing health-related behaviors are given opportunities to enroll in courses and other on-site program activities related to health behavior change. This program has been described elsewhere (Naditch, In press).

In 1981, after the STAYWELL program had been implemented in approximately ten American cities, a decision was made to examine the extent to which computer technology could be used to address fundamental unsolved problems in health behavior change.

Matching People to Programs

If one were somehow able to develop the most effective weight control program ever made, the results in changing weight behaviors would most likely be modest or disappointing. The same program simply does not work for everyone. People enter weight and other health behavior change programs with markedly different histories, levels of skills and knowledge, strengths, weaknesses, and levels of social support. If a program could manage to match people to the program intervention most likely to be successful for that person, the clinical efficacy of the program should significantly improve.

Although there has been a significant body of research that has focused on the effects of individual difference variables and program outcomes, there is very little definitive work that would enable one to effectively match individual differences with the programs most likely to be effective for each person. The PLATO STAYWELL Program has developed a procedure to make this possible. For each behavioral intervention (for example, weight control), the user completes a behavioral profile prior to beginning the program. This behavioral profile contains operationalized versions of the key variables in the clinical literature that have been hypothesized to relate individual differences to program outcomes. For example, in the area of weight control, behavior profile variables include knowledge about nutrition, the degree of social support at home, the degree of overweight, the number of programs the person has been in previously, sex, and other demographic characteristics.

In the initial iteration of the program, subjects are randomized across a number of intervention approaches contained within the program. These intervention approaches represent approaches and configurations of program intervention approaches. For example, in the weight control program, some people may either lose weight at the beginning of the program using either a fixed diet, a program of avoiding certain foods and eating others, or a program of calorie counting.

When a sufficient sample of people have run through the program, the individual difference variables are examined using regression equations to determine their efficacy in predicting outcomes at the end of the program and 12 months after the program is over. Individual difference variables that are useful predictors remain in the model and those that do not account for significant...
variance are deleted. Variables whose main or interactive effects account for significant variance are then used to match individuals to program paths in the next iteration. This procedure is repeated with each iteration, and the program is gradually able to make increasingly accurate predictions about the effects of matching people to program paths.

Program Branching

Each program path includes branches so that individuals who are not doing well may move to an alternative intervention, have the intervention they are in enriched with adjunctive material, or repeat certain aspects of the intervention they have already experienced. Each branch point is treated and tested as an alternative experimental intervention. The efficacy of branch points are analyzed and reanalyzed with each new cohort of people comprising one of the iterations in the evaluation process. In this manner, branches may be deleted, new branches may be added, or branches may be kept for people with certain characteristics but not used as branches for people who do not share those characteristics.

Tailoring Skill Training to Individual Needs

The behavioral profile is supplemented during the program with other self-report data related to an individual's lifestyle and needs. These variables are used to suggest choices or menus of specific lessons to users. For example, in the weight control program, subjects who entertain clients in restaurants, eat many of their meals in restaurants, or who travel frequently are offered lessons focusing on those specific issues. In this manner, people are matched with the skill lessons that are directly relevant to their situation and level of knowledge, and are not exposed to non-relevant lessons.

Tracking and Commentary

The program tracks each user's program history, and uses that data to review progress with each user. Tracking in the weight program, for example, focuses on pounds lost. Tracking in the fitness program, for example, focuses on kilocalories expended, resting pulse rate, and changes in mood since the beginning of the program. This tracked information is presented in a graphic form at the beginning of each lesson. This graphic tracking of progress enables the user to assess their own progress with other people who have taken the program. As the program data base accesses information, users will be able to compare themselves with other users who have specific demographic characteristics. For example, a user can ask, "How does my progress compare with that of other white women executives who are my age in this company?"

The commentary and tracking functions are key elements in the user's flow through the program. After a specific program path is selected, the user begins a lesson. Lessons usually involve the introduction of some specific knowledge or skill area relevant to the user, a simulation in which the user is given the opportunity to apply new information in life-like context, and an assignment through which the individual has the opportunity to try out those specific skills in a real world context prior to the next lesson. For example, in the weight control program, a lesson concerned with eating in restaurants introduces basic skills related to eating and maintaining a low calorie diet, allows the person the opportunity to order a low calorie meal from a simulated restaurant menu in a social context in which other people are strongly and tenaciously encouraging the person to eat a higher calorie meal, allows the individual to track how many calories are in the meal that they have chosen, and makes suggestions for alternative choices and for modes of handling interpersonal situations in which people are encouraging the user to eat more calories than he or she would like.

When the user returns to the next lesson, information is collected about progress and success over the last week. That information is used in the tracking system to present progress, and the user is given an opportunity to engage in a dialogue-like interchange with the computer concerned with the success or failure of the assignment for that week. The dialogue is actually a simple set of options in which the user either moves on to the next lesson, repeats some aspect of the last lesson, modifies their goals into smaller steps, or reconsiders their objectives and moves on to a new course of action.

Personalization Through Familiar Interaction

The computer-managed program is further individualized by having a friendly, supportive tone, referring to the user's name, remembering statements made by the user earlier in the program, allowing users a wide latitude of choice, as well as enabling the tracking of individual's progress and comparison with the progress of other people.

Continued Social Support

The program provides continuing social support by nature of its continued availability. Unlike conventional program interventions, where the instructor or the class disperse when the course is over, the computer terminal continues to be available for the user to come back to review, continue or reassess progress at any time.

By remembering the user's earlier data, and by having a number of lessons that focus on long-term maintenance, the user is able to experience the program as continuous, friendly, supportive, personal, and responsive even after the user has been away for many months.

The program currently can run either on a free-standing microcomputer using floppy disks or a microprocessor tied into a central computer.
via a telephone modem. In those instances where there is access to the central computer, the program provides a social support network that enables people to communicate with one another about their progress. The primary mode of this communication is through a system called PLATO Notesfiles.

Notesfiles are an electronic bulletin board in which users may write statements that can be read by other users. Users reading statements can respond with statements of their own or initiate new statements. Notesfiles can be open to all users or access can be limited to users with specific characteristics. Users who complete the program, or users who are having trouble at various portions within the program related to social support, have the opportunity to read and write in notesfiles of users who are also attempting to stop smoking, lose weight, manage their stress, continue in a program of physical fitness, or manage their blood pressure. Users have the option of creating new notesfiles that may limit group membership, focus on selected topics, or be geographically specific. For example, a localized notesfile can be used to match partners for fitness activities.

Program Evolution and Theory Construction

The efficacy of the program in producing behavioral change is evaluated using a multiple regression-based structural equation model. This structural equation causal model can be represented pictorially as a causal flow diagram. The flow diagram is one representation of a formal theory, and the model tests the parameters of that theory using regression equations. The theory is redefined with each subsequent iteration of users, and basically serves as a paradigm for the evolution of cumulative scientific research in this area. This scheme is similar to the proposal for the formalization of theory developed by Blalock (1969). In this situation, the evolution and testing of the computer-based instructional model, the clinical model examining the efficacy of person-therapeutic intervention interactions, and the formal theoretical model are synchronous.

Computer Configuration

The PLATO STAYWELL Program runs on a Control Data 110 microprocessor. The program uses two floppy disks that are run on a one-disk drive unit. In each course area, there is a personal disk and a public disk. The personal disk contains information about the individual's health risk profile, and evaluation data. The public disk contains specific course lessons.

A program session is initiated when the user inserts his or her private disk. The private disk greets the person, discusses progress during the week, and refers the user to a specific lesson on the public disk. The private disk is removed, the public disk inserted, and the user takes the lesson on the public disk. After completing a lesson on the public disk, the individual returns to the private disk where a specific homework assignment is determined that enables the user to apply the information learned in the lesson.

The program can run either with or without the notesfiles support group function. Notesfiles require a modem hook up through which the microprocessor can have access to the central computer and to other users.

Programs for weight control, smoking cessation, blood pressure management, physical fitness, and stress management are currently in use at Control Data work sites. Programs for nutrition will be available later in 1983.

Bibliography
