Chapter 2

BEHAVIOR CHANGE

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Executive Summary

Behavior change—an essential component of a well-care system

Health risk behaviors like smoking, inactivity, unhealthy diets, nonadherence to prescribed therapies, and ineffectively managed stress significantly contribute to a population's morbidity, disability, mortality, reduced productivity, and escalating healthcare costs. To have a significant and sustainable impact on these behaviors, a model of behavior change is needed to address the needs of entire populations, not just the minority who are motivated to take immediate action. The Transtheoretical Model of Behavior Change (TTM) is founded on stages of change, which categorize segments of populations based on where they are in the process of change. Principles and processes are applied to initiate movement through the stages of change. Interventions tailored to specific needs allow programs to be interactive and broadly applicable for treatment of entire populations. Computer Tailored Interventions (CTIs) delivered through various modalities, such as clinical guidance, telephonic counseling, and the Internet produce high impact on both single and multiple behaviors for disease prevention and management. These interventions involve new paradigms that complement existing ones, such as proactive stage-matched interventions for multiple behaviors delivered to homes via computers with evidence based on population trials using impact metrics. These integrated paradigms have the potential to provide the foundation for a well-care system, which will complement the existing sick-care system.

Learning Objectives

1. Learn the major constructs of the Transtheoretical Model of Behavior Change (TTM).
2. Select and apply TTM principles at each stage of change when working with patients and populations.
3. Understand the critical assumptions of the TTM.
4. Realize the importance of multiple behavior changes.
5. Describe the provider's role in understanding and managing the behaviors of patient populations.

Key Words

multiple behavior changes
processes of change
stages of change
Transtheoretical Model of Behavior Change

INTRODUCTION

Healthcare providers and patients have a shared responsibility for population health. As the ultimate authority on their personal health, patients have responsibility for sharing health-related information with their providers. Healthcare providers are responsible for listening to patients' concerns and providing advice accordingly. This shared responsibility is essential for all patient populations and is especially important for those dealing with chronic conditions. Behaviors affect morbidity, and extremely unhealthy behaviors may lead to mortality. Understanding what causes patients to exhibit certain behaviors and what motivates them to change provides information that can be broadly applicable to populations with similar characteristics.

In this chapter, we focus on the provider's role in understanding and managing the behaviors of patient populations. Behavior change is important in several domains of chronic care management: (1) in personal health care, when providers work with a patient to change the behaviors that are contributing to or exacerbating the patient's disease; (2) in quality and safety, as it relates to advising patients on the risks of smoking, for example; and (3) in public health activities, in advising populations to receive the H1N1 vaccination for protection from the pandemic. Behavior affects three of the four pillars of population health, demonstrating that it is a key driver in population health management. (See Box 2-1) It is the healthcare provider's role to advise patients on the risks of their behaviors and the benefits of changing unhealthy ones. Providers can follow the **Transtheoretical Model of Behavior Change (TTM)** in advising patients, but it is the patient's responsibility for accepting the provider's advice and taking action. While this model has traditionally been applied to individuals, it can also be used to describe the health of populations because communities can influence the behavior of its members.

BOX 2-1 FOUR PILLARS OF POPULATION HEALTH

Population Health

Chronic Care Management	Health Policy
Quality and Safety	Public Health

THE TRANSTHEORETICAL MODEL OF BEHAVIOR CHANGE

The Transtheoretical Model of Behavior Change (TTM) uses stages to integrate processes and principles of change across major theories of intervention—hence, the name Transtheoretical. This model emerged from a comparative analysis of leading theories grounded in psychotherapy and behavior change. Because more than 300 psychotherapy theories were found, the authors determined that there was a need for systematic integration.[1] Ten **processes of change** emerged, including consciousness raising from the Freudian tradition, contingency management from the Skinnerian tradition, and helping relationships from the Rogerian tradition.

In an empirical analysis of self-changers compared to smokers in professional treatments, researchers assessed how frequently each group used each of the ten processes.[2] Research participants indicated that they used different processes at different times in their struggles with smoking. These naive subjects were teaching us about a phenomenon that was not included in any of the multitude of therapy theories. They were revealing that behavior change unfolds through a series of stages.[3] This early discovery is the reason that TTM is often applied to smoking-cessation interventions.

From the initial studies of smoking, the stage model rapidly expanded in scope to include investigations and applications to a broad range of health and mental health behaviors. Examples include alcohol and substance abuse, stress, bullying, delinquency, depression, eating disorders and obesity, high-fat diets, HIV/AIDS prevention, mammography screening, medication compliance, unplanned pregnancy prevention, pregnancy and smoking, radon testing, sedentary lifestyles, and sun exposure. Over time, behavior studies have expanded, validated, applied, and challenged the core constructs of the Transtheoretical Model.

CORE CONSTRUCTS

The TTM has concentrated on six ***stages* of change**, 10 *processes* of change, decisional balance (the pros and cons of changing), self-efficacy, and temptation. Stages of change lie at the heart of the TTM. Studies of change have found that people move through a series of stages when modifying behavior. While the time a person can stay in each stage

is variable, the tasks required to move to the next stage are not. Certain principles and processes of change work best at each stage to reduce resistance, facilitate progress, and prevent relapse. These include decisional balance, self-efficacy, and processes of change. Only a minority (usually less than 20%) of a population at risk is prepared to take action at any given time. Thus, action-oriented advice disserves individuals in the early stages. Advice based on the TTM results in increased participation in the change process because it appeals to the whole population rather than the minority ready to take action.

STAGES OF CHANGE

The stage construct represents a temporal dimension. Change implies phenomena occurring over time. Surprisingly, none of the leading theories of therapy contained a core construct representing time. Traditionally, behavior change was often construed as an event, such as quitting smoking, drinking, or overeating, but the TTM recognizes change as a process that unfolds over time, involving progress through a series of stages.

Precontemplation People in the precontemplation stage do not intend to take action in the foreseeable future, usually measured as the next six months. Being uninformed or underinformed about the consequences of one's behavior may cause a person to be in the precontemplation stage. Multiple unsuccessful attempts at change can lead to demoralization about the ability to change. Both the uninformed and underinformed tend to avoid reading, talking, or thinking about their high-risk behaviors. They are often characterized in other theories as resistant, unmotivated, or unready for health promotion programs. The fact is, traditional population health promotion programs were not ready for such individuals and were not motivated to meet their needs.

Contemplation Contemplation is the stage in which people intend to change in the next six months. They are more aware of the pros of changing, but are also acutely aware of the cons. In a meta-analysis across 48 health risk behaviors, the pros and cons of changing were equal. This weighting between the costs and benefits of changing can produce profound ambivalence that can cause people to remain in this stage for long periods of time. This phenomenon is often characterized as chronic contemplation or behavioral procrastination. Individuals in the contemplation stage are not ready for traditional action-oriented programs that expect participants to act immediately.

Preparation Preparation is the stage in which people intend to take action in the immediate future, usually measured as the next month. Typically, they have already taken some significant action in the past year. These individuals have a plan of action, such as joining a health education class, consulting a counselor, talking to their physician, buying a self-help book, or relying on a self-change approach. These are the people who should be recruited for action-oriented programs.

Action Action is the stage in which people have made specific overt modifications in their lifestyles within the past six months. Because action is observable, the overall process of behavior change often has been equated with action. But in the TTM, action is only one of six stages. Typically, not all modifications of behavior count as action in this model. In most applications, people have to attain a criterion that scientists and professionals agree is sufficient to reduce risk of disease. For example, reduction in the number of cigarettes or switching to low-tar and low-nicotine cigarettes were formerly considered acceptable actions toward smoking cessation. Now the consensus is clear—only total abstinence counts.

Maintenance Maintenance is the stage in which people have made specific overt modifications in their lifestyles and are working to prevent relapse; however, they do not apply change processes as frequently as do people in action. While in the maintenance stage, people are less tempted to relapse and grow increasingly more confident that they can continue their changes. Based on temptation and self-efficacy data, researchers have estimated that maintenance lasts from six months to about five years. While this estimate may seem somewhat pessimistic, longitudinal data in the 1990 Surgeon General's report support this temporal estimate.[4] After 12 months of continuous abstinence, 43% of individuals returned to regular smoking. It was not until 5 years of continuous abstinence that the risk for relapse dropped to 7%.[4]

Termination Termination is the stage in which individuals are not tempted; they have 100% self-efficacy. Whether depressed, anxious, bored, lonely, angry, or stressed, individuals in this stage are sure they will not return to unhealthy habits as a way of coping. It is as if the habit was never acquired in the first place or their new behavior has become an automatic habit. Examples include adults who have developed automatic seatbelt use or who automatically take their anti-hypertensive medication at the same time and place each day. In a study of former smokers and alcoholics, researchers found that less than 20% of each group had reached the criteria of zero temptation and total self-efficacy.[5] The criterion of 100% self-efficacy may be too strict or it may be that this stage is an ideal goal for population health efforts. In other areas, like exercise, consistent condom use, and weight control, the realistic goal may be a lifetime of maintenance. Termination has not been given as much emphasis in TTM research because it may not be a practical reality for populations and it occurs long after interventions have ended.

PROCESSES OF CHANGE

Processes of change are the experiential and behavioral activities that people use to progress through the stages. It is important for all practitioners of population health to understand these progressions. They provide important guides for intervention programs, serving as independent variables that are applied to move from stage to stage. Ten processes have received the most empirical support in our research to date.

Consciousness Raising Consciousness raising involves increased awareness about the causes, consequences, and cures for a particular problem behavior. Healthcare provider interventions that can increase awareness include feedback, confrontations, interpretations, and bibliotherapy. Sedentary patients, for example, may not be aware that their inactivity can have the same risk as smoking a pack of cigarettes a day.

Dramatic Relief Dramatic relief initially produces increased emotional experiences followed by reduced affect or anticipated relief if appropriate action is taken. Healthcare providers can provide health risk feedback and success stories to move people emotionally.

Environmental Reevaluation Environmental reevaluation combines both affective and cognitive assessments of how the presence or absence of a personal habit affects one's social environment, such as the effect of smoking on others. It can also include the awareness that one can serve as a positive or negative role model for others. Providers can have patients ask others about their behavior and have family interventions that lead to such reassessments.

Self-Reevaluation Self-reevaluation combines both cognitive and affective assessments of one's self-image with and without a particular unhealthy habit, such as one's image as a couch potato versus an active person. Values clarification, identifying healthy role models, and imagery are techniques that healthcare providers can use to move patients toward self-reevaluation. During interaction with a patient, the provider might ask, "Imagine you were free from smoking. How would you feel about yourself?"

Self-Liberation Self-liberation is both the belief that one can change and the commitment, as well as the recommitment, to act on that belief. Encouraging patients to make New Year's resolutions, public testimonies, or a contract are ways of enhancing willpower. The provider might say, "Telling others about your commitment to take action can strengthen your willpower. Who are you going to tell?"

Social Liberation Social liberation requires an increase in social opportunities or alternatives, especially for patients who are relatively deprived or oppressed. For example, advocacy, empowerment procedures, and appropriate policies can produce increased opportunities for minority health promotion, gay health promotion, and health promotion for impoverished segments of the population. These same procedures can also be used to help populations change; examples include smoke-free zones, salad bars in school cafeterias, and easy access to condoms and other contraceptives. Healthcare providers can promote changes in society, encouraging a healthy lifestyle and making it easier to achieve.

Counterconditioning Counterconditioning requires learning healthy behaviors as substitutes for problem behaviors. Examples of counterconditioning include healthcare provider recommendations for use of nicotine replacement as a safe substitute for smoking or walking as a healthier alternative than "comfort" foods as a way to cope with stress.

Helping Relationships Helping relationships combine caring, trust, openness, and acceptance, as well as support for healthy behavior change. Rapport building, a therapeutic alliance, supportive calls, and buddy systems can be sources of social support that healthcare providers could offer. SilverSneakers, an exercise program often covered by Medicare, is an example of a program that providers could offer to their patients.

Reinforcement Management Reinforcement management provides consequences for taking steps in a positive direction. While contingency management can include the use of punishment, we found that self-changers rely on reward much more than punishment. So, we recommend that healthcare providers emphasize reinforcement because a philosophy of the stage model is to work in harmony with how people change naturally. Patients expect to be reinforced by others more frequently than occurs, so they should be encouraged to reinforce themselves through self-statements like "Nice going—you handled that temptation." They also need to treat themselves at milestones as a way to provide reinforcement and to increase the probability that healthy responses will be repeated.

Stimulus Control Stimulus control removes cues for unhealthy habits and adds prompts for healthier alternatives. In this process, healthcare providers can recommend removing all the ashtrays from the house and car or removing high-fat foods that are tempting cues for unhealthy eating.

DECISIONAL BALANCE

The process of reflecting and weighing the pros and cons of changing is decisional balance. Originally, TTM relied on Janis and Mann's[6] model of decision making that included four categories of pros: instrumental gains for self, instrumental gains for others, approval from self, and approval from others. The four categories of cons were instrumental costs to self, instrumental cost to others, disapproval from self, and disapproval from others. In a long series of studies attempting to produce this structure of eight factors, a much simpler structure was almost always found—the pros and cons of changing. Sound decision making requires the consideration of the potential gains (pros) and losses (cons) associated with a behavior's consequences. Providers can tell patients, for example, that there are more than 50 scientific benefits of regular physical activity and encourage patients to make a list to see how many they can identify. They can also list the cons. The more the list of pros outweighs the cons, the better prepared patients will be to take effective action.

SELF-EFFICACY

Self-efficacy is the situation-specific confidence that people have while coping with high-risk situations without relapsing to their unhealthy habit. This construct was integrated from Bandura's[7] self-efficacy theory.

TEMPTATION

Temptation reflects the intensity of urges to engage in a specific habit while in the midst of difficult situations. Typically, three factors reflect the most common types of tempting situations: negative affect or emotional distress, positive social situations, and craving. Asking patients how they will cope with emotional distress without relying on a cigarette or comfort foods can help them cope more effectively and thereby build their confidence or self-esteem.

CRITICAL ASSUMPTIONS

The Transtheoretical Model is also based on critical assumptions about the nature of behavior change and population health interventions that can best facilitate such change. The following set of assumptions drives Transtheoretical theory, research, and practice:

1. Behavior change is a process that unfolds over time through a sequence of stages and providers and health population programs will need to assist patients as they progress over time.
2. Stages are both stable and open to change, just as chronic behavioral risk factors are both stable and open to change. Population health initiatives can motivate change by enhancing the understanding of the pros and diminishing the value of the cons.
3. The majority of at-risk populations is not prepared for action and will not be served by traditional action-oriented prevention programs. Helping patients set realistic goals, like progressing to the next stage, will facilitate the change process.
4. Specific processes and principles of change need to be emphasized at specific stages for progress through the stages to occur. Table 2-1 outlines which processes to apply at each stage.

Table 2-1 Processes of Change That Mediate Progression Between the Stages of Change

Precontemplation	Contemplation	Preparation	Action	Maintenance
Consciousness Raising				
Dramatic Relief				
Environmental Reevaluation				
	Self-Reevaluation			
		Self-Liberation		
			Counterconditioning	
			Helping Relationships	
			Reinforcement Management	
			Stimulus Control	

Note: Social Liberation was omitted due to its unclear relationship to the stages.

These critical assumptions need to be taken into consideration when developing a population-based approach to behavior change and facilitating progress through the stages.

EMPIRICAL SUPPORT AND CHALLENGES

Each of the core constructs has been the subject of a number of studies across a broad range of behaviors and populations. Applying the TTM to new behaviors involves formative research and measurement,[8] followed by intervention development and refinement, eventually leading to formalized efficacy and effectiveness trials. We have selected a sample of these studies for discussion.

STAGE DISTRIBUTION

If interventions are to match the needs of entire populations, there is a need to know the stage distributions of specific high-risk behaviors. A series of studies on smoking in the United States clearly demonstrated that less than 20% of smokers are in the preparation stage in most populations.[9,10] Approximately 40% of smokers are in the precontemplation stage and another 40% are in the contemplation stage. In countries that have not had a long history of tobacco control campaigns, the stage distributions are even more challenging. In Germany, about 70% of smokers are in precontemplation and about 10% of smokers are in preparation,[11] while in China, more than 70% are in precontemplation and about 5% are in preparation.[12] With a sample of 20,000 members of an HMO across 15 health risk behaviors, only a small portion were ready for action.[13]

PROS AND CONS STRUCTURE ACROSS 12 BEHAVIORS

Across studies of 12 different behaviors (smoking cessation, quitting cocaine, weight control, dietary fat reduction, safer sex, condom use, exercise acquisition, sunscreen use, radon testing, delinquency reduction, mammography screening, and physicians practicing preventive medicine), the two-factor structure was remarkably stable. This means that helping patients to make better decisions involves focus on just the pros and cons of changing.

INTEGRATION OF PROS AND CONS AND STAGES OF CHANGE ACROSS 12 HEALTH BEHAVIORS

Stage is not a theory; it is a construct. A theory requires systematic relationships between a set of constructs, ideally culminating in mathematical relationships. Systematic relationships have been found between stages and the pros and cons of changing for 12 health behaviors.

In all 12 studies, the pros of changing were higher than the cons for people in precontemplation.[14] In all 12 studies, the pros increased between precontemplation and contemplation. From contemplation to action for all 12 behaviors, the cons of changing were

lower in action than in contemplation. In 11 of the 12 studies, the pros of changing were higher than the cons for people in action. These relationships suggest that to progress from precontemplation, the pros of changing need to increase; to progress from contemplation, the cons need to decrease; and to progress to action, the pros need to be higher than the cons.

STRONG AND WEAK PRINCIPLES OF PROGRESS

Across these same 12 studies and 48 behaviors, mathematic relationships were found between the pros and cons of changing and progress across the stages.[15]

The Strong Principle is: $PC \rightarrow A \cong 1\ SD \uparrow PROS$

Progress from precontemplation (PC) to action (A) involves an approximate one standard deviation (SD) increase in the pros of changing. On intelligence tests, a one SD increase would be 15 points, which is a substantial increase. In a recent meta-analysis of 48 health behaviors and 120 data sets from 10 countries, it was predicted that the pros of changing would increase 1 SD. The remarkable result was that the Strong Principle was confirmed to the second decimal, with the increase being 1.00 SD.[16]

The Weak Principle is: $PC \rightarrow A \cong 0.5\ SD \downarrow CONS$

Progress from precontemplation to action involves approximately 0.5 SD decrease in the cons of changing. The evidence from the recent meta-analysis for the Weak Principle was not as exact, with the result being 0.56 SD. Nevertheless, the multitude of data on 48 behaviors from 120 data sets could be integrated in a single graph that supports the two mathematic principles.

Practical implications of these principles to population health programs are that for change to occur, the pros of changing must increase about twice as much as the cons must decrease. Perhaps twice as much emphasis should be placed on raising the benefits as on reducing the costs or barriers. For example, if couch potatoes in precontemplation can list only 5 pros of exercise, then being too busy will be a big barrier to change. But if program participants come to appreciate that there can be more than 65 benefits for 150 minutes of exercise a week, being too busy becomes a relatively smaller barrier.[17]

PROCESSES OF CHANGE ACROSS BEHAVIORS

One of the assumptions of the TTM is that there is a common set of change processes that people can apply across a broad range of behaviors. Across problem behaviors, the higher order structure of the processes (experiential and behavioral) replicates better than the specific processes.[18] Typically, support has been found for the standard set of 10 processes across behaviors such as smoking, diet, cocaine use, exercise, condom use, and sun exposure. However, the structure of the processes across studies has not been as consistent as the structure of the stages and the pros and cons of changing. The processes used to

initiate change vary by behavior. An infrequent behavior, such as conforming to an annual screening test (e.g., mammogram), may require fewer processes to progress to long-term maintenance.[19]

RELATIONSHIP BETWEEN STAGES AND PROCESSES OF CHANGE

One of the earliest empirical integrations was the discovery of systematic relationships between the stages people were in and the processes they were applying. This discovery allowed an integration of processes from theories that were typically seen as incompatible and in conflict. For example, the Freudian theory relied almost entirely on consciousness-raising for producing change. This theory was viewed as incompatible with Skinnerian theory that relied entirely on reinforcement management for modifying behavior. But self-changers did not know that these processes were theoretically incompatible and their behavior revealed that processes from very different theories needed to be emphasized at different stages of change. This integration suggests that, in early stages of population health management, efforts should support the application of cognitive, affective, and evaluative processes to progress through the stages. In later stages, these programs should rely more on commitments, conditioning, rewards, environmental controls, and support to progress toward maintenance or termination.

Table 2-1 has important practical implications to population health projects. To help people progress from precontemplation to contemplation, processes such as consciousness raising and dramatic relief need to be applied. Applying reinforcement management, counterconditioning, and stimulus control processes in precontemplation would represent a theoretical, empirical, and practical mistake. Conversely, such strategies would be optimally matched for people in the action stage.

Integration of the processes and stages has not been as consistent as the integration of the stages with the pros and cons of changing. Part of the problem may be the greater complexity of integrating 10 processes across six stages, but the processes of change require more basic research.

APPLIED STUDIES

A large, diverse body of evidence on the application of TTM has revealed several trends. The most common application involves TTM computerized, tailored communications, which match intervention messages to an individual's particular needs[20,21] across all TTM constructs. Tailored interventions are population-based. They combine the best of population health with clinical health to provide individualized help. Providers could prescribe them to their patients. For example, individuals in precontemplation could receive feedback designed to increase their pros of changing to help them progress to contemplation. These interventions have most commonly been either printed on-site or mailed to participants at home.[22] However, a growing range of applications are developing, and developers

are evaluating more immediate multimedia computerized, tailored interventions[23] that can be delivered in clinic settings, at worksites, in schools, or online at home.

The growing range of settings where TTM is being applied also includes primary care offices,[24,25,26] churches,[27] campuses,[28] and communities.[29] Increasingly, employers and health plans are making such TTM-tailored programs available to entire employee or subscriber populations. Providers can assess whether patients have access to such programs and recommend the patients apply the programs as part of the change process that has been initiated through the clinical relationship. A recent meta-analysis of tailored print communications found that TTM was the most commonly used theory across a broad range of behaviors.[30] TTM or Stage of Change Models were used in 35 of the 53 studies. In terms of effectiveness, significantly greater effect sizes were produced when tailored communications included each of the following TTM constructs: stages of change, pros and cons of changing, self-efficacy, and processes of change.[30] In contrast, interventions that included the non-TTM construct of perceived susceptibility had significantly worse outcomes. Tailoring non-TTM constructs, like social norms and behavioral intentions, did not produce significant differences.[30]

These unprecedented impacts require scientific and professional shifts in our approach to population health:

- from an action paradigm to a stage paradigm;
- from reactive to proactive recruitment of participants;
- from expecting participants to match the needs of our programs to having our programs match their needs;
- from clinic-based to community-based behavioral health programs that still apply the field's most powerful individualized and interactive intervention strategies; and
- from assuming some groups do not have the ability to change to making sure that all groups have easy accessibility to evidence-based programs that provide stage-matched tailored interventions. Without such access, behavior change programs cannot serve entire populations.

MULTIPLE BEHAVIOR CHANGE PROGRAMS: INCREASING IMPACTS

One of the greatest challenges for the application of any theory is to keep raising the bar, that is, to be able to increase the theory's impact on enhancing health. Our original impact equation was Impact = Reach × Efficacy. With TTM clinical trials having recruited 80% or more of eligible smokers in a population, any increase in impact would have to come from increased efficacy, such as the abstinence rate among smokers. After more than a decade of attempts, this promise has not been fulfilled. The reason for a decline in outcomes probably was due to a mismatch of an action-oriented intervention to smokers who were not

prepared to quit.[31] For example, doubling the number of computer interactions failed to improve efficacy because there were no dose–response relationships.[32] Adding a handheld computer designed to bring smoking under stimulus control, followed by nicotine fading, actually produced worse outcomes. Similarly, providing patches for nicotine replacement therapy (NRT) also showed no evidence of increasing efficacy.[33] Adding telecounseling, with computers calling smokers on a set schedule and interacting with them on the telephone or smokers calling into the computers, also failed to increase efficacy.[33]

Recruitment limitations create a ceiling on recruitment and efficacy, which have not improved since our first population-based clinical trial in 2001. This is a problem for many interventions in the realms of behavioral health and mental health. The efficacy of antidepressant medication has not improved in more than 25 years, even though the pharmaceutical industry has invested many resources to produce breakthroughs that could generate huge profits.

One potential alternative for TTM is to treat multiple behaviors in a population because populations with multiple behavior risks are at greatest risk for both chronic disease and premature death. These multiply comorbid populations also account for a disproportionate percentage of healthcare costs. The best estimates are that about 60% of healthcare costs are generated by about 15% of populations, who have multiple behavior risks and medical conditions.[34] The research literature indicates that changing multiple behaviors on a population basis would be a particularly risky test. A thorough review of the literature funded by the Robert Wood Johnson Foundation failed to find any evidence for the efficacy of treating multiple behaviors. The established wisdom has been that it is not possible to successfully treat multiple behaviors simultaneously, because it places too many demands on a population.[35] An example might be a patient in his late 40s, who was diagnosed with type 2 diabetes; his physician told him he needed to test his glucose four times a day, take his medications twice a day, change his diet, start to exercise, quit smoking, and lower his stress. Such prescriptions for so much action would be overwhelming, and this patient was only prepared to take action on one behavior. With the help of a healthcare provider, this patient would likely make progress toward changing multiple behaviors.

The studies conducted to date on **multiple behavior changes** have been limited by reliance on the action paradigm, the frequent use of quasi-experimental designs, and the lack of applying the most promising interventions, such as interactive and individualized TTM-tailored communications.[36] From a TTM perspective, applying an action paradigm to multiple behaviors would indeed risk overwhelming populations, because action is the most demanding stage and taking action on two or more behaviors at once could be overwhelming. Furthermore, in individuals with four health behavior risks, like smoking, diet, sun exposure, and sedentary lifestyles, less than 10% of the population was ready to take action on two or more behaviors.[37] The same thing was true for populations with diabetes who needed to change four behaviors.[38]

Applying our best practices through the use of a stage-based multiple behavior manual and computerized tailored feedback reports over 12 months, we proactively intervened on a population of parents of teens who were participating in parallel projects at school.[39] We were able to engage 83.6% of the available parents. The treatment group received up to three expert system reports at 0, 6, and 12 months. At 24 months, the treatment group was outperforming the control on all three cancer prevention behaviors: smoking cessation, healthier diets, and safer sun exposure practices.

With a population of 5,545 patients from primary care practices, we were able to proactively recruit 65% for a second multiple behavior change project.[40] In this project, mammography screening was targeted in addition to the three aforementioned cancer prevention behaviors. Significant treatment effects were found for all four target behaviors at 24 months.

Comparisons across three multiple-risk behavior studies demonstrated that the efficacy rates for smoking cessation were no better than the 22% and 25% abstinence effect that we consistently found when targeting only the single behavior of smoking.[41] Further, it was found that smokers with a single risk were no more successful in quitting than smokers who were treated for two or three risk behaviors. The same was found for participants with a single risk of diet or sun exposure compared to those with two or three risk behaviors. Overall, these results indicate that TTM-tailored interventions may be producing unprecedented impacts on multiple behaviors for disease prevention and health promotion.

FUTURE RESEARCH

While research results to date are encouraging, much still needs to be done to advance practical behavior change through evidence-based efforts such as the Transtheoretical Model. Basic research needs to be done with other theoretical variables, such as processes of resistance, framing, and problem severity, to determine if such variables relate systematically to the stages and if they predict progress across particular stages. More research is needed on the structure or integration of the processes and stages of change across a broad range of behaviors, including acquisition behaviors such as exercise and extinction behaviors like what has been accomplished for smoking cessation.[42] What modifications are needed for specific types of behaviors, such as fewer processes, perhaps, for infrequent behaviors like mammography screening?

Because tailored communications represent the most promising interventions for applying TTM to entire populations, more research is needed comparing the effectiveness, efficiency, and impacts of alternative technologies. The Internet is excellent for individualized interactions at low cost, but it has not produced the high participation rates generated by person-to-person outreach via telephone or visits to primary care practitioners. Increasingly, employers are incentivizing employee populations to participate in more integrated

Internet, telephone, and provider programs. Interventions that were once seen as applicable only on an individual basis are being applied as high-impact programs for population health.

How do diverse populations respond to stage-matched interventions and to high-tech systems? How could programs best be tailored to meet the needs of diverse populations? Could menus of alternative intervention modalities (e.g., telephone, Internet, neighborhood or church leaders, person-to-person, or community programs) empower diverse populations to best match health-enhancing programs to their particular needs?

Changing multiple behaviors represents special challenges, such as the number of demands placed on participants and providers. Alternative strategies need to be tried beyond the sequential (one at a time) and simultaneous (all treated intensely at the same time). Integrative approaches are promising. For example, with bullying prevention, there are multiple behaviors (e.g., hitting, stealing, ostracizing, mean gossiping, labeling, damaging personal belongings) and multiple roles (bully, victim, and passive bystander) that need to be treated. An integrated approach is needed to address these needs in the given time constraints. If behavior change is construct-driven (e.g., by stage or self-efficacy), what is a higher order construct that could integrate all of these more concrete behaviors and roles? In a study where relating with mutual respect was used as a higher order construct, significant and important improvements across roles and behaviors were found for elementary, middle, and high school students.[43] As with any theory, effective applications may be limited more by our creativity than by the ability of the theory to drive significant research and effective interventions.

FUTURE PRACTICE

Applying TTM on a population basis to change multiple health risks has required the use of innovative paradigms that complement established paradigms. Table 2-2 illustrates how a population paradigm using proactive outreach to homes complements the individual patient paradigm that passively reacts when patients seek clinical services. The use of the stage paradigm complements the action paradigm which assumes that because patients are seeking services, they are prepared to take action. The use of CTIs complements the traditional reliance on clinicians, and the treatment of multiple behaviors complements the established clinical wisdom of treating one behavior at a time. The population-theme paradigm based on impacts (reach $\times$ efficacy $\times$ Σ # of behaviors changed) complements individualized clinical trials with select samples that rely on efficacy. Integrating these new paradigms can produce the foundation for a well-care system to complement the established sick-care system. Combining the two systems would enhance the health and well-being of many more people by healing the sick, while maximizing wellness for all.

Table 2-2 Inclusive Care from Two Clusters of Paradigms for Individual Patients and Entire Populations

Patient Health	complemented by	Population Health
1. Individual patients		Entire populations
2. Passive reactance		Proactive
3. Acute conditions		Chronic conditions
4. Efficacy trials		Effectiveness trials
5. Action-oriented		Stage-based
6. Clinic-based		Home-based
7. Clinician-delivered		Technology-delivered
8. Standardized		Tailored
9. Single target behavior		Multiple target behaviors
10. Fragmented		Integrated

CONCLUSIONS

The Transtheoretical Model is a dynamic theory of change and it must remain open to modifications and enhancements as more students, scientists, and practitioners apply the stage paradigm to a growing number of diverse theoretical issues, public health problems, and at-risk populations.

STUDY AND DISCUSSION QUESTIONS

1. What is the Transtheoretical Model of Behavior Change?
2. What are the stages of change included in the Transtheoretical Model?
3. What is your role, as a healthcare provider, in helping a patient who is in precontemplation realize the benefits of changing?
4. If you are encountered by a smoker with multiple health behavior risks, how would you help manage this patient's need for multiple behavior changes?

SUGGESTED READINGS AND WEB SITES

READINGS

Hall KL, Rossi JS. Meta-analytic examination of the strong and weak principles across 48 health behaviors. *Prev Med*, 2008;46(3):266–274.

Prochaska JO, DiClemente CC, Norcross JC. In search of how people change: applications to addictive behaviors. *Am Psychol*. 1992;47(9):1102–1114.

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WEB SITES

Basic Transtheoretical Model Training: contact elearning@prochange.com

Cancer Prevention Research Center: www.uri.edu/research/cprc

Coaches' Guide for Using the TTM with Clients: contact info@prochange.com

Pro-Change Behavior Systems, Inc.: www.prochange.com

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