

# **HHS Public Access**

Prog Cardiovasc Dis. Author manuscript; available in PMC 2018 March 01.

Published in final edited form as: *Prog Cardiovasc Dis.* 2017 ; 59(5): 455–462. doi:10.1016/j.pcad.2016.09.003.

## Role Of Counseling To Promote Adherence In Healthy Lifestyle Medicine: Strategies to Improve Exercise Adherence and Enhance Physical Activity

#### Gregory L. Stonerock and James A. Blumenthal

Author manuscript

Department of Psychiatry and Behavioral Sciences, Duke University Medical Center, Durham, NC

## Abstract

Although healthy lifestyles (HL) offer a number of health benefits, nonadherence to recommended lifestyle changes remains a frequent and difficult obstacle to realizing these benefits. Behavioral counseling can improve adherence to a HL. However, individuals' motivation for change and resistance to altering unhealthy habits must be considered when developing an effective approach to counseling. In the present article, we review psychological, behavioral, and environmental factors that may promote adherence and contribute to nonadherence. We discuss two established models for counseling, motivational interviewing and the transtheoretical model of behavior change, and provide an example of how these approaches can be used to counsel patients to exercise and increase their levels of physical activity.

#### Keywords

adherence; behavioral counseling; exercise; motivational interviewing; transtheoretical model; stages of change

## Introduction to Healthy Lifestyle Medicine

Healthy Lifestyle (HL) medicine (HLM) is an emerging field that refers to a systematic approach to the management of chronic diseases, including coronary heart disease, hypertension, arthritis, chronic obstructive pulmonary disease, and even cancer [1]. Although there have been significant advances in the prevention and management of chronic diseases, it is widely recognized that HL—that is, health behaviors such as smoking, dietary habits, coping with stress, and physical inactivity—play an important role in the onset and course of many chronic diseases [2, 3]. Although physicians may prescribe HL changes such as weight loss, smoking cessation, and exercise/physical activity (PA), getting patients to actually adhere to these recommendations can be quite challenging [4]. Moreover, even

Correspondence: Gregory Stonerock, PhD, Box 3119, Duke University Medical Center, Durham, NC 27710; tel: (919) 684-8843; fax: (919) 684-8629; gregory.stonerock@duke.edu.

Disclosures/COI: The authors report no conflict of interest.

**Publisher's Disclaimer:** This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

when effective pharmacologic, behavioral, and psychological interventions are available, motivating individuals to initiate and maintain lifestyle interventions can be difficult. This chapter will: a) define adherence; describe ways of measuring it, and discuss factors associated with non-adherence; b) describe models for counseling patients in lifestyle behavior change; and c) discuss how these models can be applied to counseling patients in order to initiate and sustain exercise and to increase daily PA.

#### Adherence to Prescribed Medical Therapies and HL Recommendations

*Adherence* has been defined as "the extent to which a person's behavior (in terms of taking medications, following a diet, exercising or making other lifestyle changes) coincides with medical or health advice" [5], and is also referred to as compliance [6]. *Nonadherence*, or discordance between health behaviors and health advice, can adversely affect, and even eliminate, the effectiveness of medical interventions. Though dependent on the measures used, some estimates in general medical populations suggest that up to 40% of patients do not adhere adequately to physician instructions, with the prevalence rate rising to 70% or more when significant lifestyle modification or complex behavior changes are required [7]. Nonadherence can render treatment ineffective and undermine confidence in the health provider. Overall annual costs in the United States associated with nonadherence have been estimated to be in the hundreds of billions of dollars [8], with inadequate PA contributing to an estimated10% of aggregate health care expenditures [9].

The most common means of assessing patient's adherence is by self-report. Simply asking patients about their lifestyle habits is expedient and provides an opening to discuss behavior change. Beyond face-to-face questioning, standardized questionnaires such as Morisky's medication adherence measures [10, 11] and screening measures of alcohol use [12, 13] can provide reliable estimates of medication and substance use. Psychological factors can reduce the accuracy of self-report, however, such as limited recall, denial, deliberate fabrication, and socially desirable responding to providers (e.g., telling the provider what they think the provider wants to hear). That said, self-report of medication adherence can still be a useful predictor of risk of cardiovascular (CV) events [14], and self-report is a valid and appropriate first-line approach to obtaining information about patients' lifestyle habits. Providers can also solicit estimates of adherence from patients' family members or caregivers, with the goal of decreasing response bias. However, this method may suffer from similar drawbacks in terms of accuracy and potential response bias.

A number of methods have been employed to assess lifestyle behaviors more objectively. For example, rather than asking patients to recall their tobacco use, providers can obtain lab assays from blood or saliva for nicotine or cotinine levels [15]. For medications, providers can conduct a pill count, and large meta-analyses of adherence have been conducted using prescription refills as a proxy for adherence [16]. Providers can collect attendance logs for activities such as exercise programs, nutritional counseling sessions, and smoking cessation classes.

More recently, technological advances have allowed for fine-grained measurement of patient adherence. Using technology to track medication adherence has received much attention [17,

Accelerometers, pedometers, and fitness trackers are popular applications of technology for obtaining reliable estimates of PA. These technologies allow both patients and providers to collect high volumes of data concerning daily PA.

#### Factors Associated with Adherence and Nonadherence

When behavioral recommendations are complex, risk for nonadherence increases [7]. HL changes for the most at-risk patients can involve wide-ranging, comprehensive changes to their health behaviors. Instructions for these changes can be difficult for patients to comprehend and remember, let alone to implement. Perhaps unsurprisingly, lower health literacy is associated with greater risk of medical nonadherence, as are lower socioeconomic status and educational achievement, though other demographic predictors are less clearly implicated [22]. Patients are more likely to follow prescribed medical therapies if they understand the rationale for the treatment, and if the treatment is simple and clear.

Psychological factors also can affect adherence. For example, patients with significant depressive symptoms are less likely to follow behavioral recommendations to reduce risk after myocardial infarction [23], take medications as prescribed [24], and adhere to exercise in cardiac rehabilitation [25]. It is not uncommon for patients who have had a major cardiac event to experience elevated depressive symptoms, with more than a third of cardiac patients either diagnosed with major depression or exhibiting significant depressive symptomatology [26], so many patients are at risk for non-adherence to prescribed therapies.

Patients' beliefs and interpretations about behavior change can influence their adherence as well. Patients may not feel an immediate benefit from changes in their medical regimen. Indeed, when patients try to make HL changes, they may only feel the downsides at first - blandness in their food choices, pain and fatigue from exercise, nicotine withdrawal symptoms, cravings for unhealthy foods, and the like. Concerning medication adherence, patients often cite side effects and costs in their decisions about whether to adhere or discontinue their medications [27]. If patients are already symptomatic from their CV conditions, it should not be unsurprising that a patient would think that the additional burdens of behavior change were too much more to take on. Furthermore, the benefits of HL behaviors are not immediate, and when patients question whether medications or behavior change are helping, they are less likely to be adherent [28]. If patients perceive greater costs of behavior change than benefits, adherence will suffer.

However, patient beliefs also can play a strong role in promoting good adherence. For example, patients are more likely to sustain behavior change when they perceive themselves as vulnerable to their disease, see their health concerns as serious, and believe that their treatment is effective.

The clinical setting itself can promote stronger adherence by providing a consistent, warm, and positive environment. Adherence is greater when patients perceive a strong, collaborative relationship with providers [28]. Clinics can help by ensuring contact with the same provider regularly across visits, minimizing waiting time, and involving the patient's social support system in their recommendations.

#### Models of Counseling HL Behaviors

#### Motivational Interviewing

Motivational interviewing (MoI) is a patient-centered conversational approach to behavior change proposed by Miller and Rollnick [29]. The approach encourages providers to take a collaborative stance, avoid provoking resistance, elicit the patient's own motivations for change, and focus their attention on resources and planning for carrying these changes out. MoI was initially developed as a treatment technique for individuals with alcohol abuse. Miller and Rollnick describe transitioning away from viewing people who abuse alcohol as disturbed, dishonest, or illogical actors, instead recognizing their autonomy and trying to understand their behavioral choices. Furthermore, they point out that by giving advice and assuming that the patient is uninformed or already motivated to change, a provider can alienate the patient, increase resistance, and make behavior change less likely.

The "spirit" of MoI is considered key to the process. It includes listening actively and nonjudgmentally, working to understand the patient's perspective, and helping the patient to make their own conclusions about why and how to change. The aim is for providers to help guide a conversation about change, activating patients' intrinsic motivation. Miller and Rollnick contrast this "guiding" approach both with directing the patient (imposing new behaviors, pushing against resistance) and with avoiding the subject of change altogether.

Since its beginnings in substance abuse counseling, MoI has been applied to a wide array of health behaviors, targeting healthy individuals as well as people with CV disease (CVD). In one study of 60 patients with congestive heart failure, those patients randomized to participate in home-based MI sessions (whether alone or combined with standard care) significantly increased their PA levels compared to patients receiving standard care alone; however, all groups improved their 6-minute walk times at posttest [30].

Miller and Rollnick [29] describe a series of four MI strategies for practitioners to help patients make behavior changes:

**1. Engaging**—In the first step, engaging, practitioners talk with the patient to understand their perspective in a nonjudgmental way. A key component is avoiding assumptions, for example, that the patient feels ready to change or thinks the same way as the practitioner about their current behavior. Instead, providers start by setting an agenda together with the patient, for example, asking whether they would like to discuss reducing smoking, increasing exercise, or the like as part of the visit. In the process, providers provide reflections on what the patient reports, establish rapport, and ensure they have an accurate understanding of how the patient views the behavior of interest.

Stonerock and Blumenthal

**2. Focusing**—In this second step, practitioners listen for themes the patient discloses about change ("change talk") and gently guide the conversation to stay on these points. Patients at this early point in the process may also be offering "sustain talk," that is, talking about why they might want to keep their lifestyle habits as they are. A practitioner can ensure that the patient knows that the sustain talk was heard while also helping the patient to think more closely about change. For example, if talking about exercise with a sedentary patient, a provider first could ask the patient to talk about what they like about their current lifestyle, and then focus the patient's attention on what they might like about exercise/PA.

**3. Evoking**—In the third step, evoking, practitioners help patients verbalize their own new goals, desired outcomes, and reasons for change. Rather than prescribing a behavior (e.g., exercise three times a week), a provider can encourage a patient to talk through what they feel would be a good first step (e.g., any amount of exercise/PA) and, importantly, why they feel it would help. When patients feel stuck, providers can offer information and suggestions in a nonthreatening way (e.g., describing a step that other patients in a similar situation have taken), then ask the patient for their thoughts.

**4. Planning**—At this stage, patient and provider collaborate on how to execute change. Practitioners help patients to talk through specific, concrete goals, to identify resources needed to achieve those goals, and to set up ways to evaluate how well their plan worked after change is attempted.

#### Mol in the Health Care Setting

For complex behavioral issues such as substance abuse, MoI is often carried out over the course of multiple sessions, leaving ample time for each of the steps above. However, logistically this may not prove practical, as providers in medical settings tend not to have the means or training to provide regular, structured behavioral counseling. Thus, models have been developed to apply MI strategies to everyday, and often brief, medical communication. In one such approach, founded in MoI [31], practitioners can guide a conversation about change by assessing their attitudes in three areas:

**1. Importance**—How important is it to the patient to change? For example, one might expect a patient to view smoking cessation as very important if he or she sees a negative impact on their breathing, relationships with family, finances, and the like when they smoke. However, that same patient may not feel that change is important, that change could feel worse than staying the same, or that change is less important right now than other priorities.

**2. Confidence**—How confident does the patient feel that they can make a change? A patient who has had many unsuccessful attempts to maintain exercise may feel demoralized and unlikely to succeed on another attempt, or may have renewed vigor, information on a different approach, or simply feel they are in a better position to make sustained change than in the past.

**3. Readiness**—How much does the patient feel that they can start the change process now? Imagine a practitioner asks a patient to rate on a scale from 1–10, 10 being highest,

Stonerock and Blumenthal

how ready they feel to stop smoking now. If the patient is mildly ready, e.g., 3 out of 10, the provider can ask why the motivation is not lower (1 or 2). The patient then would have a chance to articulate the motivation that is already present, which can then be explored and reinforced.

Assessment of all three dimensions can be enlightening. For example, Rollnick, Mason, and Butler [31] describe the challenges of two different patients who smoke regularly but are not attempting to quit yet. The first feels it is imperative to quit as soon as possible (high importance), but concerned that the attempt will fail (low confidence), and thus does not make an attempt. The second feels entirely confident about quitting, but does not see that quitting should be important or that now is a good time (low importance and readiness). MoI strategies could help the former feel more confident, perhaps with planning, whereas the second could benefit more from earlier phases of MoI (e.g., focusing on pros of change).

#### The Transtheoretical Model of Behavior Change

The 'transtheoretical model' (TTM) of behavior change [32] was originally proposed by Prochaska and DiClemente in the 1970s as a way to better understand, and treat, addictive disorders such as smoking and later alcohol abuse. Over the past 4 decades, the model has been applied to a wide range of health behaviors ranging from substance abuse to overeating and physical inactivity with the goal to help health professionals to design, implement, and evaluate health-promoting interventions delivered at the population, community, and individual level. TTM assesses an individual's readiness to initiate healthier behaviors and provides strategies to guide individuals through a series of 'stages of change' to achieve HL behaviors. Because TTM uses a temporal, 'stage' model, to integrate processes of change from a number of diverse theories of intervention, the approach is considered 'transtheoretical.' [33]. It should be noted that the model is not without controversy. Critics suggest that the model oversimplifies behavior [34, 35]. Moreover, empirical evidence supporting stage-based interventions is mixed [36–38]. Nevertheless, TTM has stimulated much research and is considered to be a valuable vehicle for behavior change by many practitioners.

There are four central concepts to the TTM of behavior change: 1) stages of change; 2) processes of change; 3) self-efficacy; and 4) decisional balance.

**1. Stages of change**—The TTM proposes a five-stage model of change to help health care providers better understand their patients' readiness for making lifestyle changes. TTM considers change as a process involving progression through a series of stages. Underlying this model is the assumption that understanding patients' readiness to change will help guide health professionals to select the interventions that are most likely to be successful. The five stages of change include:

**Precontemplation:** Individuals in the precontemplation stage have not considered changing their health habits and may not consider their behavior to be a problem. These individuals may lack knowledge about the deleterious effects of their behavior or have a fixed set of beliefs that exclude behavior change. They also may be resigned to not being able to modify their behavior or have given up hope that they will be able to successfully make lifestyle

Stonerock and Blumenthal

changes. They also may have a set of rationalizations about why their lifestyle habits are not a problem. Some may be rebellious and simply maintain their poor health habits as an act of defiance. These are the kinds of patients whom health providers consider unmotivated and represent some of the most difficult challenges facing health providers.

**Contemplation:** Individuals in this stage are willing to consider making HL changes but, for a variety of reasons, are unable to take the first step. They have some appreciation of the benefits of making lifestyle changes (which may be referred to as the 'pros'), but also are acutely aware of the disadvantages or negative aspects of making behavioral changes (i.e., the 'cons'). Many may be ambivalent because of low feelings of self-efficacy or a reluctance to give up old habits. Regardless of their motivation, these individuals are not willing to fully embrace the commitment to change their behavior.

**Preparation:** In this stage, individuals intend to change their behavior and have made an initial effort to make lifestyle changes. Not all of their ambivalence has been resolved and they have developed an initial, albeit tentative, plan of action. For example, they might have joined a gym, bought a self-help book, or met with a counselor. Individuals in this stage have begun to put their thoughts of changing into action, but have not sustained their behavior consistently.

Action: Individuals in this stage have now put their plan into action and they have actually demonstrated their ability to adopt healthy habits on a consistent basis. These individuals are on the road to making lasting behavior change, but they have not engaged in the new behaviors for an extended time period (i.e., less than 6 months) that would suggest that the behaviors are now ingrained and permanent.

**Maintenance:** This stage of enduring behavior change is referred to as "maintenance" and involves consistently engaging in the health behavior for at least 6 months. In this stage, HL is becoming firmly established, and the threat of relapse, i.e., reverting back to old, unhealthy patterns becomes less frequent and intense. Individuals in maintenance typically have a plan for coping with relapse to prevent a prolonged period of non-adherence to the new healthy behaviors. Relapse can occur at any stage, but typically describes individuals who move from Maintenance or Action to less persistent health behaviors better characterized as Preparation or Contemplation.

A sixth stage, *'Termination'*, also has been described, but it is seldom used and is more aspirational than practical. It refers to a stage in which the individual has no temptation to revert to past behavior (e.g., to resume smoking or drinking, stop exercising, not practicing weight control or not adhering to prescribed medications) and has full confidence in the ability to maintain the behavior change regardless of life circumstance.

**2. Processes of change**—Process of change refer to the covert and overt activities that people use to progress through the aforementioned stages. The process of change construct provides strategies for patients and guidelines for interventionists to help patients transition from one stage to the next. The key processes include Consciousness Raising (to increase awareness about the causes and consequences of poor health behaviors); Dramatic Relief (to

Page 8

generate emotional responses to motivate action such as providing inspirational anecdotes about how people have changed and addressing feelings of fear or anxiety about unhealthy behaviors); Self-revaluation (combines both cognitive and affective self-evaluations with and without such behaviors and helping patients realize that the healthy behavior is an important part of who they are -- and who they want to become); Environmental Revaluation (involves cognitive and affective assessments about how the behavior affects the social environment and helping patients realize how their unhealthy behavior affects others and how they could have more positive effects by changing); Self-liberation (the belief that behavior change is possible and the individual is committed to it); Social-liberation (requires an increase in social opportunities); Counterconditioning (requires the learning of healthier behaviors that replace unhealthy habits); Stimulus Control (removes cues for unhealthy behaviors and adds prompts for healthier alternatives); Contingency Management (provides consequencesboth positive and negative-for health behaviors); and Helping Relationships (which combine caring and support for health behavior change). As people move toward Action and Maintenance, they rely more on commitments, conditioning, contingencies, environmental controls, and support [39].

**3. Decisional balance**—According to TTM, interventions to change behavior are more effective if they are "stage-matched," i.e., matched to each individual's stage of change. TTM considers the decision to make lifestyle changes a largely conscious and deliberate decision based upon a careful weighing of the advantages (the "pros") of changing behavior and the disadvantages (the "cons"). TTM calls this decisional balance, which can be quantified such that as the individual progresses through each stage, the 'pros' are believed to increasingly outweigh the 'cons'.

**4. Self-efficacy**—This concept refers to the situation-specific confidence that an individual has in the ability to engage in the healthy behavior in the face of high risk situations without relapsing to their previous unhealthy habits.

#### Counseling Patients to Increase PA and to Engage in Exercise

Combining MoI and the TTM strategies to increase PA is an approach to maximize the likelihood that the patient will initiate or increase their level of PA. A first step is to determine the patient's stage of change. A list of potential questions for providers to ask themselves prior to offering behavioral counseling is provided in Table 1. Conducting this type of self-assessment helps to fine-tune the agenda setting and rapport building needed for successful counseling. Furthermore, using more structured instruments, such as an exercise-specific survey [40], can give providers a more quantifiable assessment of the stage of change.

If the individual is in the 'pre-contemplative' stage, he or she will not even have thought about exercise. At this point, the 'eliciting' and 'focusing' steps of MoI can help the individual to consider making a change and the provider to suggest changes that are realistic. An initial step would be to educate the individual on the health benefits of exercise and provide a rationale for the recommendation. Providers may wish to approach the discussion of lifestyle change in a structured fashion, assessing motivation before moving on to other

steps, such as addressing barriers to change [41]. A health provider can play a critical role by increasing patient awareness through information, education, and personal feedback. A collaborative approach is recommended, in which patient and provider form a partnership in developing a plan for behavior change.

Similarly, information can be valuable for individuals in the 'Contemplation' stage. For patients who are chronically in contemplation (e.g., procrastinators or ruminators), information may help to motivate them to the Preparation stage. Inquiring about patients' prior exercise history, what they may have tried in the past, and what they know about exercise is a good starting point. While discussing these points, a provider can help the individual to focus on why they made the past attempts, evoking more of their intrinsic motivation. At this point, helping patients to develop a specific plan can also be helpful: when they might exercise, where, and how much.

An exercise prescription typically involves 4 elements: Mode (what kind of exercise/PA), Frequency (how often to exercise), Duration (how long to exercise), and Intensity (how intense to exercise). The specific details would depend on the person's health (e.g., whether they have CVD or CVD risk factors, are overweight, have musculoskeletal limitations, etc.), and may require a formal exercise stress test to establish a safe "training range" as a target for heart rate. Generally, organizations such as the American Heart Association, the American College of Sports Medicine, and the Centers for Disease Control generally recommend moderate-intensity aerobic (endurance) PA for a minimum of 30 min on five days each week or vigorous-intensity aerobic PA for a minimum of 20 min on three days each week [42].

One approach at this stage is to encourage contemplators to become more mindful of their decision making and more conscious of the multiple benefits of changing an unhealthy behavior. Review of pros and cons can also be useful, as can discussion of issues contributing to ambivalence about making behavior change. However, this type of review should be done carefully. From an MoI perspective, ideally the individual can be helped to articulate pros and cons actively on their own. When providers 'prescribe' certain behaviors directly to the individual, this can invite resistance and passivity, leading to a disappointing and frustrating exchange for both parties. One more collaborative approach is to describe steps others have tried for starting exercise/PA, so that the individual can talk through which option could be most realistic for them. Seeking social support can also be beneficial, as others can influence and help effectively at this stage by encouraging them to work at reducing the cons of changing their behavior.

Individuals in Preparation are ready to start taking action. Their intrinsic motivation is higher, and they may benefit more from planning than from focusing further on why they wish to change their behavior. Individuals in this stage may actually have begun to exercise, join a gym, or purchase exercise equipment. They take small steps that they believe can help them make the healthy behavior a part of their lives. They also may have made public statements that they want to change their behavior. People in this stage should be encouraged to seek support from family and friends they trust, tell people about their plan to change the way they act, and think about how they would feel if they exercised regularly. Their primary

concern is whether they will be able to exercise consistently or will fail. In these cases, one helpful approach can be to first prompt individuals to reassess their confidence about changing on a 1–10 scale, then ask what would help them step up to the next number on the scale. Daily record keeping, goal setting, prompts such as leaving running shoes and exercise clothes out in the morning, and planning when to exercise are very useful strategies.

Individuals in the Action stage have begun to exercise consistently, but not for longer than 6 months. These individuals need to learn how to strengthen their commitments to change and to fight urges to slip back. Even though these individuals are making changes, they still may need intermittent 'focusing' and 'evoking' conversations to reaffirm their motivations to change. People in this stage progress by reminding themselves of the reasons why exercise is beneficial and by reinforcing strategies for keeping up their commitments such as substituting activities related to sedentary behavior with positive ones, rewarding themselves for taking steps toward changing, and avoiding people and situations that tempt them to behave in unhealthy ways. Discussions that revisit the individual's motivations can also help them increase the intensity of exercise/PA over time.

Finally, people in Maintenance have changed their behavior more than 6 months ago. It is important for people in this stage to be aware of situations that may tempt them to slip back into doing the unhealthy behavior—particularly stressful situations. It is recommended that people in this stage seek support from others and talk with people whom they trust, spend more time with people who behave in healthy ways, and remember to engage in exercise even when they may not feel like it.

#### Helping patients cope with relapse

Achieving long-term behavior change often requires ongoing support from family members, a health coach, a physician, or another motivational source. Lapses are inevitable, especially when it comes to exercise. Sickness, a new job, added work responsibilities, injury, and even vacation can help to derail the best intentioned exerciser. It can be useful to help patients develop a plan for making sure that a lapse does not evolve into relapse. Supportive literature and other resources can also be helpful to avoid a relapse from happening. When individuals have relapsed, it can be useful to prompt the individual to reassess how confident they feel that they can change and how important they feel resuming exercise is. The individual can then reaffirm their motivations for change and articulate the next step in preparing for exercise again.

#### **Summary and Conclusions**

The importance of HLM to endorse HL and to prevent disease and treat chronic medical conditions is now recognized and accepted by the medical community. However, even the best of treatments are only effective to the extent that patients adhere to treatment recommendations. Adherence to prescribed medical therapies can be especially challenging when treatment regimens are complex or require adoption of new behaviors. Patients may have some knowledge about the importance of such lifestyle behaviors as smoking cessation, healthy eating, and aerobic exercise/PA, but they may not fully understand why these behaviors are important and how they can successfully convert this knowledge into

actual behavior change. Counseling patients about lifestyle change may be critical for many patients to successfully adopt healthy behaviors. MI and TTM represent two counseling approaches that can help guide clinicians and health providers to improve their effectiveness in facilitating and promoting health behavior change. Both approaches provide a systematic strategy for engaging patients in behavior change and for developing a collaborative partnership between patient and health provider.

#### Acknowledgments

Supported, in part, by a grant (HL093374) from the National Heart, Lung, and Blood Institute, Bethesda, MD.

#### Abbreviations

| CV  | Cardiovascular             |
|-----|----------------------------|
| CVD | Cardiovascular Disease     |
| HL  | Healthy Lifestyle          |
| HLM | Healthy Lifestyle Medicine |
| MoI | Motivational interviewing  |
| РА  | Physical Activity          |
| TTM | Transtheoretical Model     |

#### References

- Kushner RF, Mechanick JI. Lifestyle Medicine—An Emerging New Discipline. US Endocrinology. 2015; 11(1):36–40.
- 2. Arena R, Harrington RA, Després J-P. A Message From Modern-Day Healthcare to Physical Activity and Fitness: Welcome Home! Progress in Cardiovascular Diseases. 57(4):293–295.
- 3. Pratt M, et al. Can Population Levels of Physical Activity Be Increased? Global Evidence and Experience. Progress in Cardiovascular Diseases. 2015; 57(4):356–367. [PubMed: 25304047]
- 4. Sallis R, et al. Strategies for Promoting Physical Activity in Clinical Practice. Progress in Cardiovascular Diseases. 2015; 57(4):375–386. [PubMed: 25459975]
- McDonald HP, Garg AX, Haynes R. Interventions to enhance patient adherence to medication prescriptions: Scientific review. JAMA. 2002; 288(22):2868–2879. [PubMed: 12472329]
- 6. Haynes, RB. Improving patient adherence: state of the art, with a special focus on medication taking for cardiovascular disorders. In: Burke, LE., Ockene, IS., editors. Compliance in Healthcare and Research. Futura; Armonk, NY: 2001. p. 3-21.
- 7. Martin LR, et al. The challenge of patient adherence. Ther Clin Risk Manag. 2005; 1(3):189–99. [PubMed: 18360559]
- Osterberg L, Blaschke T. Adherence to Medication. New England Journal of Medicine. 2005; 353(5):487–497. [PubMed: 16079372]
- 9. Carlson SA, et al. Inadequate Physical Activity and Health Care Expenditures in the United States. Progress in Cardiovascular Diseases. 2015; 57(4):315–323. [PubMed: 25559060]
- Morisky DE, Green LW, Levine DM. Concurrent and Predictive Validity of a Self-reported Measure of Medication Adherence. Medical Care. 1986; 24(1):67–74. [PubMed: 3945130]
- Morisky DE, et al. Predictive Validity of a Medication Adherence Measure in an Outpatient Setting. The Journal of Clinical Hypertension. 2008; 10(5):348–354. [PubMed: 18453793]

- 12. Ewing JA. Detecting alcoholism: The CAGE questionnaire. JAMA. 1984; 252(14):1905–1907. [PubMed: 6471323]
- Bush B, et al. Screening for alcohol abuse using the CAGE questionnaire. The American Journal of Medicine. 1987; 82(2):231–235. [PubMed: 2880504]
- Gehi AK, et al. Self-reported medication adherence and cardiovascular events in patients with stable coronary heart disease: The heart and soul study. Archives of Internal Medicine. 2007; 167(16):1798–1803. [PubMed: 17846400]
- Haley NJ, Axelrad CM, Tilton KA. Validation of self-reported smoking behavior: biochemical analyses of cotinine and thiocyanate. American Journal of Public Health. 1983; 73(10):1204–1207. [PubMed: 6614277]
- Naderi SH, Bestwick JP, Wald DS. Adherence to Drugs That Prevent Cardiovascular Disease: Meta-analysis on 376,162 Patients. The American Journal of Medicine. 2012; 125(9):882–887.e1. [PubMed: 22748400]
- Zullig, L., Shaw, R., Bosworth, H. Applying Technology to Medication Management and Adherence. In: Marsch, LA.Dallery, J., Lord, SE., editors. Behavioral Healthcare and Technology: Using Science-Based Innovations to Transform Practice. 2014. p. 81
- Park, LG., Howie-Esquivel, J., Dracup, K. Western Journal of Nursing Research. 2014. Electronic Measurement of Medication Adherence.
- Olivieri NF, et al. Compliance assessed by the Medication Event Monitoring System. Archives of Disease in Childhood. 1991; 66(12):1399–1402. [PubMed: 1776885]
- Marsch, L., Lord, S., Dallery, J. Behavioral Healthcare and Technology: Using Science-based Innovations to Transform Practice. Oxford University Press; 2014.
- 21. Vitality-About GlowCaps. [cited 2016 August 29]; Available from: http://www.vitality.net/glowcaps.html
- 22. DiMatteo MR. Variations in Patients' Adherence to Medical Recommendations: A Quantitative Review of 50 Years of Research. Medical Care. 2004; 42(3):200–209. [PubMed: 15076819]
- Ziegelstein RC, et al. Patients with depression are less likely to follow recommendations to reduce cardiac risk during recovery from a myocardial infarction. Archives of Internal Medicine. 2000; 160(12):1818–1823. [PubMed: 10871976]
- Carney RM, et al. Major depression and medication adherence in elderly patients with coronary artery disease. Health Psychology. 1995; 14(1):88–90. [PubMed: 7737079]
- Blumenthal JA, et al. Physiological and Psychological Variables Predict Compliance to Prescribed Exercise Therapy in Patients Recovering from Myocardial Infarction. Psychosomatic Medicine. 1982; 44(6):519–527. [PubMed: 7163455]
- 26. Lespérance F, Frasure-Smith N. Depression in patients with cardiac disease: a practical review. Journal of Psychosomatic Research. 2000; 48(4–5):379–391. [PubMed: 10880660]
- 27. Cohen JD, et al. Understanding Statin Use in America and Gaps in Patient Education (USAGE): An internet-based survey of 10,138 current and former statin users. Journal of Clinical Lipidology. 2012; 6(3):208–215. [PubMed: 22658145]
- Miller NH. Compliance with treatment regimens in chronic asymptomatic diseases. The American Journal of Medicine. 1997; 102(2):43–49. [PubMed: 9217586]
- 29. Miller, WR., Rollnick, S. Motivational interviewing: Helping people change. 3. 2012.
- 30. Brodie DA, Inoue A. Motivational interviewing to promote physical activity for people with chronic heart failure. Journal of Advanced Nursing. 2005; 50(5):518–527. [PubMed: 15882368]
- 31. Rollnick, S., Mason, P., Butler, C. Health behavior change: a guide for practitioners. Elsevier Health Sciences; 1999.
- Prochaska, JO., DiClemente, CC. The Transtheoretical Approach. In: Norcross, JC., Goldfried, MR., editors. Handbook of psychotherapy integration. 2. Oxford University Press; New York, NY, US: 2005. p. 147-171.
- Prochaska, JO., Norcross, JC. Systems of psychotherapy: A transtheoretical analysis. Nelson Education; 2013.
- 34. Davidson, R. The transtheoretical model: A critical overview. In: Miller, WR., Heather, N., editors. Treating addictive behaviors. 2nd. Plenum Press; New York, NY, US: 1998. p. 25-38.

- 35. Littrell JH, Girvin H. Stages of change: A critique. Behavior Modification. 2002; 26(2):223–273. [PubMed: 11961914]
- 36. Cahill K, Lancaster T, Green N. Stage-based interventions for smoking cessation. Cochrane Database of Systematic Reviews. 2010; (11)
- Tuah NAA, et al. Transtheoretical model for dietary and physical exercise modification in weight loss management for overweight and obese adults. Cochrane Database of Systematic Reviews. 2011; (10)
- 38. Adams J, White M. Why don't stage-based activity promotion interventions work? Health Education Research. 2005; 20(2):237–243. [PubMed: 15253998]
- Prochaska, JO., Redding, CA., Evers, KE. The Transtheoretical Model and Stages of Change. In: Glanz, K.Rimer, BK., Viswanath, K., editors. Health Behavior and Health Education. Jossey-Bass; San Francisco, CA, US: 2008.
- 40. Marcus BH, et al. Self-Efficacy and the Stages of Exercise Behavior Change. Research Quarterly for Exercise and Sport. 1992; 63(1):60–66. [PubMed: 1574662]
- Lehr AL, Driver SL, Stone NJ. The ABCDs of lifestyle counseling. JAMA Cardiology. 2016; 1(5): 505–506. [PubMed: 27439176]
- Haskell WL, et al. Physical Activity and Public Health: Updated Recommendation for Adults From the American College of Sports Medicine and the American Heart Association. Circulation. 2007; 116(9):1081–1093. [PubMed: 17671237]

#### Table 1

#### Questions for Providers to Consider Prior to Behavioral Counseling for Increasing PA

| Stage of Change        | Question for Providers to Ask Themselves Before Counseling Patient  |
|------------------------|---|
| Pre-contemplation      | <ul><li>Is your patient ready to consider exercise or increasing PA?</li><li>What goals might your patient have toward becoming physically active?</li></ul>  |
| Contemplation          | <ul> <li>How might your patient benefit from exercise/PA?</li> <li>What might your patient need to give up in order to become physically active?</li> <li>What barriers might your patient face that might discourage initiation of exercise/PA?</li> <li>How can your patient become more confident about PA?</li> </ul> |
| Preparation and Action | <ul> <li>How has your patient successfully changed behavior in the past?</li> <li>What might your patient need to give up in order to become more physically active?</li> <li>What barriers need to be addressed?</li> </ul>  |