

How can stages of change be best used in dietary interventions?

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The stages of change construct can be helpful in designing, delivering, and evaluating interventions to help people adopt more healthful diets. This article reviews some of the key findings from research on stages of dietary change, and in doing so, addresses the following controversies regarding use and interpretation of the construct. First, stages of dietary change should not be confused with measures of dietary behavior or nutrient intake. Rather, stage of dietary change measures what people think about their diets and their interest in change. Second, healthful dietary changes, such as eating more fruits and vegetables or eating less fat, are different from quitting smoking or other addictive drugs. Thus, interpretation of stages of dietary change requires modification to be optimally useful for intervention design and evaluation. Third, few studies have tested the applicability of other components of the Transtheoretical Model (or Stages of Change Model), such as decisional balance and processes of change, in dietary change interventions. Further work is needed to assess whether and how these components of the model apply to the adoption of healthful diets.

Stages of change is a heuristic model that describes a sequence of cognitive and behavioral steps in successful behavior change: *precontemplation*, no recognition of need for or interest in change; *contemplation*, recognition of need for and intent to change; *preparation*, planning for change; *action*, adopting new behavior; and *maintenance*, ongoing practice of new behavior. Stage of change is a key construct of the Transtheoretical Model (1), which has been used to design interventions for a wide range of health-related behavior. The Transtheoretical Model is an appealing structure because it helps identify the types of interventions that will be most

effective at each stage of change. In an ideal application of the model, a nutritionist could assess a person's stage of change, then deliver a well-defined sequence of interventions to move that person through successive stages.

Research in the application of the stages of change construct to dietary behavior is relatively new. In 1992, Curry and colleagues (2) published the first report showing that it was feasible and meaningful to assign people to a stage of change for adopting a low-fat diet. Research studies now routinely include stages of change as a component of dietary assessment, and most intervention trials have included aspects of the Transtheoretical Model in the design of their interventions. Three research questions guide this review of the literature: Can we define stages of change for adopting healthful diets, and do these stages correspond to dietary behavior? Do dietary interventions move people through stages of dietary change? Does movement through successive stages of dietary change correspond to predictable changes in diet? We conclude with suggestions on how the stages of change construct can best be applied to the adoption of healthful diets and give guidelines that nutritionists can use to incorporate the construct into nutrition intervention practice.

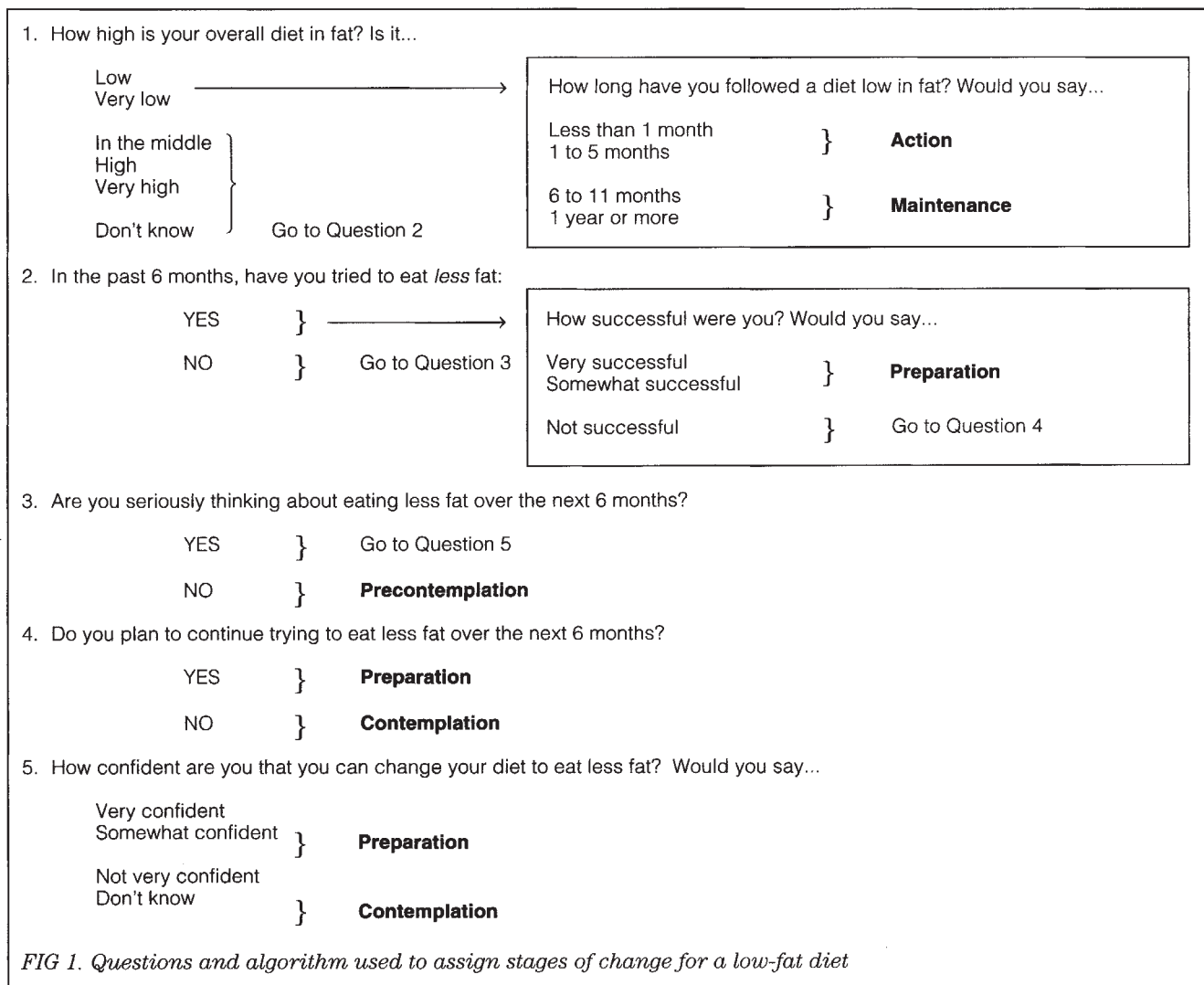
DEFINITION AND CLASSIFICATION OF STAGES OF CHANGE FOR ADOPTING HEALTHFUL DIETS

Algorithms that unambiguously classify people into a stage of dietary change are required to apply the stages of change construct to dietary behavior. Researchers have developed algorithms for assigning stages of change for 3 dietary constructs: low-fat diets, high-fiber diets, and diets high in fruits and vegetables. We focus our discussion and give examples from studies on adoption of low-fat diets, but the issues are similar for these 3 dietary constructs.

Most strategies used to categorize people into stages of change are based on assessing 3 factors: self-rated diet, previous attempts to change diet, and intention to change diet. Figure 1 shows the questions and algorithm we are using in several ongoing studies to assess stages of change in adopting a low-fat diet. People are first asked to rate their overall intake of fat as low, very low, average (in the middle), high, and very high. Those eating a diet low in fat are asked how long they have done so. Those *not* eating a low-fat diet are asked if they have

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tried to make changes in the previous 6 months and whether they were successful. People are then asked whether they are seriously thinking about making changes in the next 6 months and about their confidence to do so. People who report a diet that is average or higher in fat can be in precontemplation, contemplation, or preparation; those with no plans to make changes are in precontemplation; those with indeterminate plans and no previous attempts to change are in contemplation; and those who definitely plan to change or who have attempted change are in preparation. People who report a diet that is low or very low in fat can be in action or maintenance: those who have been eating a diet low in fat for less than 6 months are in action; those who have been eating a diet low in fat for 6 months or longer are in maintenance.

If staging algorithms are valid, there should be predictable differences in dietary behavior between persons classified into different stages of change. Table 1 summarizes many of the studies that have examined how diets differ between persons classified into stages of dietary change (2-8). All studies found significant differences in diet across stages of change; these differences are often (but not always) relatively modest between the pre-action stages (precontemplation, contemplation, and preparation) and larger between pre-action and action, and between action and maintenance. The consistency

of results across a variety of samples and assessment methods is evidence that the stages of change construct is robust and meaningful when applied to healthful dietary patterns.

Researchers have used many different approaches to defining stages of change for dietary behavior, and this has led to considerable disagreement and confusion. It is simple enough to define and measure the target behavior for an addictive behavior such as cigarette smoking (eg, "Have you smoked a cigarette in the past 24 hours?"), but what is the appropriate definition of the target behavior for healthful dietary change? One approach is based on a person's perception of his or her diet; examples from published studies on fat reduction follow: "Are you currently limiting the amount of fat in your diet?" (2), "How high in fat is your overall diet?" (4), "Do you consistently avoid high-fat foods?" (3). Persons who report that they limit their fat intake, have an overall diet that is low or very low in fat, or consistently avoid high-fat foods are classified in the action or maintenance stage. Alternatively, some researchers use what they call a behavioral criterion based on an independent measure of nutrient intake (3,9,10). Only those persons whose diets meet a specific cutoff point (eg, <30% energy from fat) can be in the action or maintenance stage.

The argument for using criteria based on nutrient intake for defining stages of change is based on research that shows

Table 1
Summary of studies^a showing associations of stages of change with diet

Reference	Dietary measure	N	Precontemplation		Contemplation		Preparation		Action		Maintenance	
			%	Mean	%	Mean	%	Mean	%	Mean	%	Mean
Curry et al (2)	Fat (% energy)	618 (female)	17	37.1	6	37.2	11	37.5	8	34.9	59	33.6
		465 (male)	29	39.1	7	37.7	7	38.6	6	36.0	50	34.8
Greene et al (3)	Fat (% energy)	614	18	39.4	14	38.7	8	36.3	13	34.8	48	32.1
Glanz et al (4)	Fat (% energy)	17,042	14	39.6	19	39.3	4	39.7	46	37.4	17	31.7
	Fiber (g/1,000 kcal)	16,980	12	6.3	28	6.5	9	6.9	33	7.7	18	9.8
Campbell et al (5)	Fat (g/day)	558	25	47.5	45	44.7			29 ^b	40.0		
	Fruit and vegetables (servings/day)		28	3.1	39	3.1			33 ^b	3.9		
Sporny and Contento (6)	Fat (% energy)	409 (female)	4	39.5	7	38.9			42	32.8	47	30.0
		206 (male)	14	39.4	14	39.0			31	37.3	41	35.4
Brug et al (7)	Vegetables (servings/day)	739	6	0.9	8	1.0	33	1.0	5	1.3	48	1.1
	Fruit (servings/day)		9	1.0	8	1.6	36	1.6	5	4.0	40	2.9
Glanz et al (8)	Fat (% energy)	2,764	10	40.6	17	39.4	2	38.6	42	38.1	29	32.3
	Fiber (g/1,000 kcal)		7	7.7	24	7.5	4	7.9	29	8.3	37	10.5

^aDoes not include studies that used nutrient intake (eg, <30% energy from fat) to define stage.

^bCombined action and maintenance.

substantial discrepancy between self-perceived and actual diet (11). Not surprisingly, few people can report with certainty whether they consume less than 30% of energy from fat or more than 20 g fiber per day. Thus, a person might believe his or her diet is very low in fat and be classified into the maintenance stage based on perceived diet; but if a person's diet is actually high in fat, he or she will not receive the appropriate stage-matched intervention. Some researchers have proposed expanded stage classification schemes that incorporate both perceived and actual diet (10,12), but more research is needed to determine if these approaches yield more useful categories for defining stages of dietary change.

In practice, using nutrient intake criteria to define stages of change can lead to 2 types of problems. The first type of problem is methodologic. As an example, consider the report by Greene et al (3) in which use of self-rated diet ("consistently avoid high-fat foods") was compared with nutrient intake (<30% of energy from fat) in assigning study participants to the action or maintenance stage. Sixty percent of participants were classified in the action or maintenance stage using self-rated diet, compared with only 20% based on nutrient intake. Mean fat intake was 34.8% and 32.1% of energy, respectively, in action and maintenance groups based on self-rated diet, compared with 29.9% and 28.5% in groups classified by nutrient intake. The authors propose that the nutrient intake approach is superior because differences in fat intake across stages of change are larger. This strong association between stage as defined using a nutrient intake criterion and nutrient intake itself is tautologic: the dependent variable (percentage energy from fat) is used to define the independent variable (stage based on <30% energy from fat). This same problem occurs in other reports (9,13). If one chooses to use nutrient intake criteria to define stages of dietary change, it is crucial to avoid methodologic errors in data analysis and study evaluation.

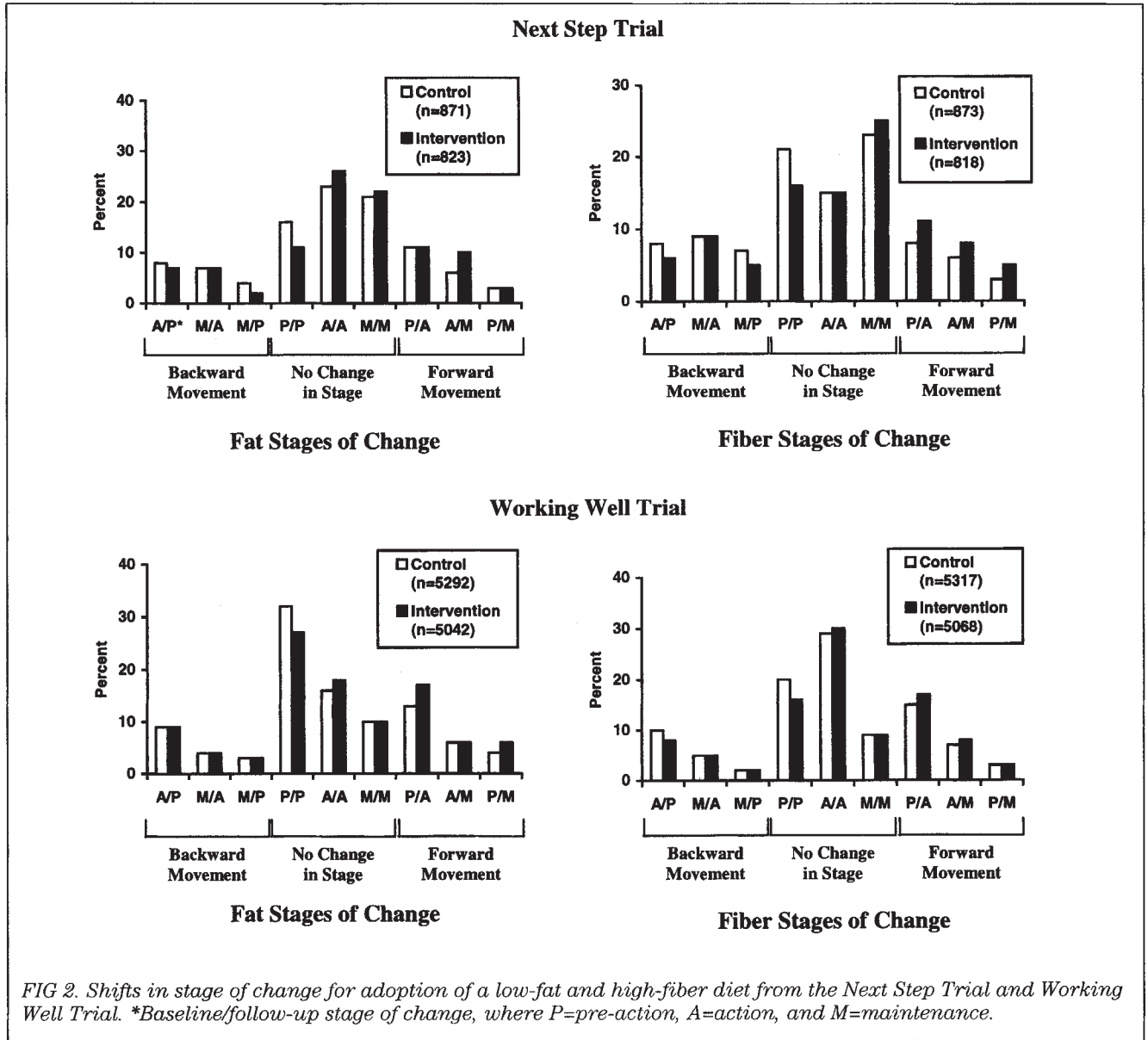
The second type of problem that results from using a nutrient intake criterion for assigning stages of change is that it can mask clinically important change. Because dietary measures are on a continuum, any criterion of healthful dietary behavior

(eg, 30% of energy from fat, 20 g fiber, 5 servings fruits and vegetables) is necessarily arbitrary. Consider the following scenario. A participant in a dietary intervention trial lowers his fat intake from 40% to 32% of energy, increases intake of fruits and vegetables from 1 to 4 servings per day, maintains these changes for over a year, and has absolutely no interest in making additional dietary changes. Is this man in the maintenance, preparation, or precontemplation stage? Was this intervention effective (a 20% decrease in energy from fat and a 4-fold increase in fruit and vegetable intake) or a failure because he did not reach a behavioral cutoff point for defining maintenance? Clearly, in not uncommon situations, definition of stages of dietary change based on nutrient intake can lead to uninformative or misleading conclusions about dietary behavior.

DIETARY INTERVENTIONS AND MOVEMENT THROUGH STAGES OF DIETARY CHANGE

An effective dietary intervention should accelerate movement from pre-action stages into the action and maintenance stages. To our knowledge, only 3 studies have reported how dietary interventions affect transition through stages of change. Greene and Rossi (9) reported percentages of participants moving from pre-action stages into action or maintenance at 6, 12, and 18 months after randomization. The proportions of respondents moving into action and maintenance increased steadily over the 18-month period, and at all assessments the proportions of participants in action or maintenance were highest for those who were in preparation at baseline, intermediate for those who were in contemplation at baseline, and lowest for those who were in precontemplation at baseline. Although not a direct measure of transition through pre-action stages, the extra time required to move from precontemplation and contemplation into action or maintenance is consistent with the hypothesized sequence of stage transitions that lead ultimately to behavior change.

Figure 2 shows results from 2 randomized trials of worksite-based nutrition interventions (14,15). Both trials found small but statistically significant intervention effects; thus, we would



expect that more participants in intervention worksites than in control worksites would move into later stages of dietary change. In both trials perceived diet was used to define stages of dietary change, which were assessed separately for low-fat diets and for diets high in fiber, fruits, and vegetables. Most participants remained in their baseline stage; few moved backward into earlier stages. As expected, significantly more participants in intervention worksites than control worksites moved into later stages of dietary change.

Overall, results from these 3 studies support the hypothesis that adopting a healthful diet follows a staged process. In addition, these studies suggest that movement through stages of change can be used as an indicator of intervention effectiveness.

NUTRIENT INTAKE AND MOVEMENT THROUGH STAGES OF DIETARY CHANGE

People moving through stages of change should make predictable changes in their dietary behavior. A straightforward inter-

pretation of stages of change leads us to expect that dietary change will be largest among people moving from a pre-action stage into maintenance, intermediate among those moving from a pre-action stage into action or from action into maintenance, and small among those not changing stage. We know of only 2 studies that have examined dietary change as a function of movement through stages of dietary change (14,15). These results, also from the 2 worksite-based intervention trials described previously, are given in Table 2. The values shown are changes in percentage energy from fat and in servings of fruits and vegetables, adjusted statistically for baseline nutrient intake, age, education, and other factors that were associated with diet and dietary change. Contrary to our expectations, both studies found that dietary change was related primarily to stage at *follow-up*: Dietary change was largest among participants in the maintenance stage and modest among those in the action stage; essentially no change was evident among those in pre-action. There were no consistent trends based on stage at baseline.

Table 2
Mean changes in fat intake and fruit and vegetable consumption by stage of change at baseline (preintervention) and follow-up (postintervention)

	Follow-up					
	Working Well Trial ^a (n=4,517)			Next Step Trial ^b (n=818)		
	Pre-action	Action	Maintenance	Pre-action	Action	Maintenance
<i>Change in fat (% energy)</i>						
Baseline						
Pre-action	0.0	-2.4	-7.3	0.0	-1.9	-5.7
Action	-0.1	-2.5	-7.0	-0.7	-0.8	-5.7
Maintenance	-1.2	-3.0	-6.3	-0.9	-2.6	-4.5
<i>Change in fruits and vegetables (servings per day)</i>						
Pre-action	0.0	0.2	1.1	-0.1	0.4	0.9
Action	0.0	0.2	1.2	0.1	-0.1	0.9
Maintenance	0.3	0.5	1.1	-0.1	0.3	0.8

^aIntervention group only, 3-y follow-up, adjusted for baseline value, age, gender, and education.

^bIntervention group only, 2-y follow-up, adjusted for baseline value, education, age, body mass index, and employment status (active/retired).

Table 3
General guidelines for applying stages and processes of change to adoption of healthful diets

State of readiness	Key strategies for moving to next stage	Treatment do's at this stage	Treatment don'ts at this stage
Precontemplation	Increased information and awareness, emotional acceptance	<ul style="list-style-type: none"> ■ Provide personalized information. ■ Allow client to express emotions about his or her disease or about the need to make dietary changes. 	<ul style="list-style-type: none"> ■ Do not assume client has knowledge or expect that providing information will automatically lead to behavior change. ■ Do not ignore client's emotional adjustment to the need for dietary change, which could override ability to process relevant information.
Contemplation	Increased confidence in one's ability to adopt recommended behaviors	<ul style="list-style-type: none"> ■ Discuss and resolve barriers to dietary change. ■ Encourage support networks. ■ Give positive feedback about a client's abilities. ■ Help to clarify ambivalence about adopting behavior and emphasize expected benefits. 	<ul style="list-style-type: none"> ■ Do not ignore the potential impact of family members, and others, on client's ability to comply. ■ Do not be alarmed or critical of a client's ambivalence.
Preparation	Resolution of ambivalence, firm commitment, and specific action plan	<ul style="list-style-type: none"> ■ Encourage client to set specific, achievable goals (eg, use 1% milk instead of whole milk). ■ Reinforce small changes that client may have already achieved. 	<ul style="list-style-type: none"> ■ Do not recommend general behavior changes (eg, "Eat less fat"). ■ Do not refer to small changes as "not good enough."
Action	Behavioral skill training and social support	<ul style="list-style-type: none"> ■ Refer to education program for self-management skills. ■ Provide self-help materials. 	<ul style="list-style-type: none"> ■ Do not refer clients to information-only classes.
Maintenance	Problem-solving skills and social and environmental support	<ul style="list-style-type: none"> ■ Encourage client to anticipate and plan for potential difficulties (eg, maintaining dietary changes on vacation). ■ Collect information about local resources (eg, support groups, shopping guides). ■ Encourage client to "recycle" if he or she has a lapse or relapse. ■ Recommended more challenging dietary changes if client is motivated. 	<ul style="list-style-type: none"> ■ Do not assume that initial action means permanent change. ■ Do not be discouraged or judgmental about a lapse or relapse.

Why would mean reduction in fat be almost the same for those remaining in maintenance as for those moving from a pre-action stage into maintenance? We suspect this is because even those already eating a healthful diet can make additional dietary changes. The dietary changes made by those starting and remaining in maintenance were likely more challenging; those made by people moving from pre-action into maintenance were probably simpler and more easily implemented. Thus, dietary change interventions can be relevant and effective regardless of stage. A good dietary intervention program would include a range of components and targets for dietary change, so that there will be goals for behavior change that are appropriate for people at all stages of change.

INTERPRETING THE STAGES OF CHANGE CONSTRUCT IN THE CONTEXT OF DIETARY CHANGE

Dietary behavior is fundamentally different from behaviors such as smoking and using drugs. Thus, creative interpretation of the stages of change construct is required in reference to diet. We always need to eat. Preferences for foods with fat, sugar, and salt and dislike of foods that are bitter can be modified, but they cannot be eliminated (16). We eat a healthful diet by maintaining cognitive vigilance about how we purchase, prepare, and select foods. Diets vary over time, because the food supply changes and because we enjoy eating many different foods. How then do these unique characteristics of dietary behavior affect how we can use the stages of change construct to understand and motivate dietary change?

We recommend 2 perspectives on the stages of change to make the construct more applicable to dietary change. First, the stages of dietary change construct is most useful when the target behavior is defined using self-rated diet. In this way, the construct tells you less about what people are eating and more about what people are thinking. Thus, we can take the onus off stages of change as a measure of dietary behavior and use it instead as a measure of cognitive and behavioral engagement with the dietary change process. This does not imply that accurate assessment of nutrient intake is not useful for dietary intervention. Estimates of usual nutrient intake can be used as personalized feedback to help raise awareness and motivate change (17). Rather, knowledge of nutrient intake can be used in conjunction with stages of change to deliver a more personalized and targeted intervention.

Second, the action and maintenance stages should be interpreted as the time for developing and maintaining cognitive and behavioral vigilance about healthful food choices. People in action will be trying many new dietary behaviors and will be in different stages for specific behaviors. People in maintenance will have adopted enough new behaviors to achieve a desired goal, but as they try new foods and food preparations they will need to monitor their nutritional qualities to maintain a healthful diet over time. In this context, recycling between maintenance and action can be viewed positively. An intervention or a health event, for example, may trigger a person in maintenance to move into action for adopting a group of new healthful behaviors. A nutritionist could use the heightened motivation of a person in maintenance as an opportunity to introduce more challenging behavior changes.

CONCLUSIONS AND RECOMMENDATIONS

Table 3 offers general guidelines for nutritionists who wish to incorporate the stages of change construct into their practice. It is fast and simple to assess stages of change as part of a personal interview (Figure 1), and information about stages of change can be used to develop a personalized intervention program. These guidelines can be useful in a range of dietary

change interventions. For most interventions, the behavioral targets will be a combination of specific changes (eg, using skim milk in cereal) and general changes (eg, avoiding fried foods); nutritionists may wish to move between general and specific targets, assessing a stage of change for each. During the next several years, nutritionists can expect to see much additional research on the use of stages of change in designing and delivering dietary interventions. More effective interventions that focus on the importance of fruits and vegetables for preventing many chronic diseases and the role of dietary fat in promoting obesity can help nutritionists play a leading role in promoting the public's health. ■

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