STAGE MODELS OF BEHAVIOUR CHANGE

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Reference:

Chapter outline

This chapter introduces stage theories of behaviour change, a set of theoretical models describing the change process as a sequence of qualitatively different stages individuals pass through on their way to sustained behaviour change. Each of these stages is defined by specific barriers to stage progression and often by specific psychological states. Consequently, it is assumed that interventions matched to specific stages are more effective in supporting people to progress towards action. The most important stage models for health psychology and standard tests of stage models are introduced, after which the evidence for these models is evaluated against these tests.

Key concepts
- Stages of change
- Stage vs. pseudo-stage models
- Mindsets
- Stage matched interventions
- Experimental matched-mismatched designs
- Transtheoretical model
- Precaution Process Model
- Rubicon model of action phases
- Intention-behaviour gap
Introduction

Stage models of behaviour change assume that changing behaviour requires a sequence of qualitatively different changes in psychological factors and practices as individuals come gradually to adopt new behaviours. These changes can be conceptualised as distinct stages an individual passes through on the way to behaviour change. For example, in order to make an appointment to receive a vaccination, an individual must have first become aware of the potential illness and the availability of a vaccine, then deliberated if getting a vaccine would be a good idea and then called the GP practice to make the appointment. At each stage, different tasks and cognitions will be of relevance.

While the idea of stages may be intuitively compelling, most theoretical models of behaviour change suggest that people can adopt new patterns of behaviour with a single decision or change in belief. Traditional social cognition models specify a small set of psychological variables such as self-efficacy, outcome expectations and intentions, which are used to predict behaviour using a single equation. In stage models, several equations are needed to predict stage progression. This chapter discusses a selection of approaches that have been devoted to describing a process of behaviour adoption in terms of stages.

Stages can be defined as a set of categorically different, ordered states, which are similar internally in terms of cognitive, emotional and behavioural features, but psychologically different from each other. Stage models are characterised by four defining features (Weinstein, Rothman & Sutton, 1998):

1. **Stage definitions**: A diagnostic algorithm which assigns individuals to an exhaustive and distinctive set of stages in accordance with cognitive and/or emotional and/or behavioural qualities.
2. **Sequence of stages**: The assumption that individuals sequentially pass through each stage on the way to adoption of new intentional behaviours and that regressions to previous stages are possible.
3. **Common barriers within the same stage**: Barriers to progressing to the next stage are those things which need to be achieved to make progress from the current to the next stage; often these barriers are associated with assumptions about common features such as stage-specific ‘mindsets’ or characteristic states resulting from successful transitions from previous stages and engagement with current barriers (Heckhausen, 1991).
4. **Different barriers between different stages**: People at different stages face different barriers, need to master different tasks, or differ regarding their mindset, and thus benefit from different interventions toward behaviour change (i.e., the variables that differentiate between people in stages 1 and 2 are not the same ones that differentiate between people in stages 2 and 3).
According to stage models, people in different stages face particular challenges in progressing to the next stage of the change process, and differ in their thoughts and feelings about the behaviour the model is applied to in each stage. The important practical implication is that interventions ‘tailored’ to an individual’s stage will be more effective than a ‘one size fits all’ intervention. Individuals deciding whether or not to act would, for example, benefit more from provision of information about behavioural consequences, whereas those who have already decided to act would benefit more from information about opportunities to act.

The following sections introduce the most important stage models relevant to health psychology, standard types of tests for such stage models, and a summary of the evidence regarding these models for each of these kinds of tests (Weinstein et al., 1998). A complete overview of all stage models is beyond the scope of this chapter and can be found elsewhere (Aunger & Curtis, in press).

**Transtheoretical Model of Change (TTM)**

Historically the first, and empirically the most frequently utilised, stage model is the ‘Transtheoretical’ or ‘Stages of Change’ model of Prochaska and colleagues (Prochaska et al., 1993; Prochaska & Velicer, 1997) ([http://www.uri.edu/research/cprc/transtheoretical.htm](http://www.uri.edu/research/cprc/transtheoretical.htm)). The TTM integrates basic principles of behaviour change from the major theories of intervention current at the time, based on clinical experience in the area of smoking cessation; hence the appellation ‘trans-theoretical.’

<table>
<thead>
<tr>
<th>STAGE</th>
<th>DEFINITION</th>
<th>PROCESSES OF CHANGE</th>
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| Precontemplation     | Not seriously thinking changing behaviour | **Consciousness Raising**: Efforts by the individual to seek new information and to gain understanding and feedback about the problem behaviour  
**Dramatic Relief**: Experiencing and expressing feelings about the problem behaviour and potential solutions  
**Environmental Reevaluation**: Consideration and assessment of how the problem behaviour affects the physical and social environment |
<p>| Contemplation         | Seriously thinking about        | <strong>Self-Reevaluation</strong> Emotional and cognitive           |</p>
<table>
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<tr>
<th>Stage</th>
<th>Description</th>
<th>Definitions</th>
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| Preparation | Seriously thinking about changing behaviour in the next 30 days | **Self-Liberation** Choice and commitment to change the problem behaviour, including belief in the ability to change  
**Social Liberation** Awareness, availability, and acceptance by the individual of alternative, problem-free lifestyles in society |
| Action    | First 6 months of abstinence                                                | **Stimulus Control** Control of situations and other causes which trigger the problem behaviour  
**Counter-conditioning** Substitution of alternatives for the problem behaviour  
**Helping Relationships** Trusting, accepting, and utilizing the support of caring others during attempts to change the problem behaviour  
**Contingency Management** Rewarding oneself or being rewarded by others for making changes |
| Maintenance | Abstinence beyond 6 months                                                  |                                                                              |
| (Termination) | Complete absence of temptation for previous behaviour                      | **No more activities needed to maintain behaviour**                            |

Note. Definitions adapted from [http://www.uri.edu/research/cprc/TTM/ProcessesOfChange.htm](http://www.uri.edu/research/cprc/TTM/ProcessesOfChange.htm), retrieved 25.05.2009.

The TTM divides people into one of five, sometimes six different *stages of change* (see Table 1). Stage definitions differ slightly dependent on the target behaviour. For the example of smoking cessation, individuals in the ‘precontemplation’ stage are not thinking about stopping smoking within the next six months. Those in the ‘contemplation’ stage are seriously deliberating about stopping sometime in the medium-term future (usually defined as between one to six months). ‘Preparation’ is the stage in which individuals intend to quit in the near term (i.e., within a month), and have taken steps to make themselves ready for quitting. ‘Action’ is the stage in which people have quit for less than six months. The individual enters the ‘maintenance’ stage once they have continuously abstinent for more than six months. The first three stages are assumed to involve motivational processes, while the latter two are behavioural. People are assumed to move through each of these stages in the order listed, although
the authors of the approach acknowledge that people might regress occasionally (i.e., move backward to an ‘earlier’ stage). In some applications, a sixth stage, ‘termination’ is added, where people have permanently adopted a new behaviour and no longer perceive any temptation to revert to their previous behaviour.

The TTM hypothesizes that there are ten independent experiential and behavioural ‘processes of change’ which facilitate stage progression, each of which is peculiar to one (or sometimes more) of these five stages (see Table 1). People in a particular stage use the associated processes to overcome the barriers of movement to the next stage. For example, those in the precontemplation stage are expected to seek out information (i.e., raise their consciousness) about the benefits of the target behaviour, or to reward themselves for making changes (reinforcement management). Thus, there are specific processes that differentiate one stage from the next, given the individual’s readiness to change their behaviour. These processes are formulated in a way that allows linking behaviour change techniques to processes of change.

Furthermore, the TTM theorises that the decisional balance of pros and cons (positive and negative outcome expectations), self-efficacy (perceive ability to perform the target behaviour) and temptation function as intermediate or “dependent” outcomes. These outcomes mediate the relationships between the processes of change and progress on the stages of change (Prochaska & Velicer, 1997).

**Empirical evidence for the TTM**

**Cross sectional tests**

Cross-sectional designs provide the weakest tests of stage model assumptions. They are, however, common because they are relatively simple to perform – one simply needs to compare people within a population at a single point in time.

Analytically, cross sectional designs support stage models, to the extent that, a) the variance within a stage of measures indicative of stage specific mindsets is smaller than the variation between stages, indicating that people in the same stage are more similar to each other than those in different stages; b) participants in different stages differ from those in other stages with regard to variables indicative of hypothesised mindsets; and c) patterns of differences in key variables between the stages are in line with the assumptions above regarding stage models.

Remember, people in different stages should face different barriers for progress, require different strategies and have different mindsets. If stages vary on some dimensions continuously (say each successive stage shows significantly higher self-efficacy or reported strength of intention to perform the target behaviour), then even if those differences between stages are significantly different quantitatively, they could indicate a single continuous process of change (i.e., ‘pseudo-stages’). Only a pattern of
discontinuous change in relevant variables suggests that people are qualitatively different from each other, and thus likely to be in different stages (Sutton, 2000).

Cross sectional evidence for the TTM
Cross sectional tests of the TTM show that patterns of differences in pros, cons, self-efficacy and temptation differ substantially over the stages of change for different health behaviours. However, in most cases, these measures show linear increases or decreases over stages, indicative of continuous differences rather than qualitative differences (Rosen, 2000). More recently, Armitage and Arden (2002) showed that the stages of change for adopting healthy food choices are a linear function of Theory of Planned Behaviour measures. The current cross sectional evidence, then, is consistent only with a ‘pseudo-stage’ mode of change.

Longitudinal tests
A somewhat stronger test of stage assumptions can be conducted using prospective or longitudinal designs, following participants to determine if and how they have changed and which variables predict progress or regress from different stages. Longitudinal designs support stage models assumptions if

a) progress follows the proposed sequence
b) progression over time can be predicted from a different set of variables in each stage and
c) stage allocation is predictive of future behaviour behaviour.

The rationale for prospective tests is that transitions from different stages would be predicted by different variables (matched to the barriers for progress defined in However, the predictive utility of measures is limited by their variability and stages usually limit the variability of key measures. For example, in stages defined by having an intention (e.g., preparation), motivational measures related to intentions (e.g., pros, cons or self-efficacy) will show reduced variance and are therefore less likely to be predictive of stage transitions than in stages with a wider range of intention levels. However, if one finds that the transition from having an intention to taking action is predicted by action planning and the transition from not thinking about changing to deliberating by knowledge, one would conclude that the finding is supportive of the idea that different factors promote stage transition at both of these hypothetical stages.

Longitudinal evidence for the TTM
The stages of change have some predictive value. For example, participants in the preparation stage for smoking cessation are more likely to subsequently quit than those in the precontemplation phase. However, when standard measures such as previous smoking behaviour and quitting history are controlled for, the stages lose their predictive utility. Likewise, long-term maintenance of cessation is better predicted by simple descriptive data about smoking patterns and quitting attempts than by the
stages (Farkas, 1996; Abrams, Herzog, Emmons, & Linnan, 2000). Similarly, de Vet and colleagues (2007) showed that the stages of change are less predictive of fruit intake that a continuous or dichotomous measure of intention.

Several studies have tested the utility of variables outside of the TTM for predicting stage progress in the stages of change and showed, for example, that theory of planned behaviour variables are predictive of stage progression. In a study of healthy food choice involving nearly 800 participants, it was found that sociodemographic variables and a stage-specific intervention predicted progression to particular stages, except for the most relevant movement from the preparation to the action stage, which was not correlated with any of the included variables (Armitage et al, 2004). Likewise, it has been shown that the predictive power of other social cognitive measures is moderated by the stage allocation (Lippke & Plotnikof, 2009).

While there is a wealth of data showing different patterns of prediction for stage transitions and behaviour prediction, there is to date no clear evidence from longitudinal research that transitions from each of the stages of change are predicted by the specific stage-specific pattern of processes of change, pros, cons, self-efficacy and temptation that the theory suggests.

**Experimental Tests**

Experiments provide the most rigorous tests of stage theories. They usually follow a ‘matched-mismatched’ design in which participants in at least two different stages are randomly assigned to at least two interventions, each of which is tailored to facilitate progress from one of the stages participants are in. Thus participants are either allocated to a condition matched or mismatched to their initial stage. If the theory has correctly defined the characteristics of stages, then the matched interventions should be more effective at promoting stage transition than the mismatched intervention. Consequently, the analysis for stage transition tests for an interaction between intervention and baseline. A theoretically weaker approach is based on experiments or randomised controlled trials in which interventions based on stage theories are compared against interventions based on other theories, or – even weaker – against passive control groups (Weinstein, et al., 1998).

Experimental evidence for the TTM

An exemplary experimental test of the TTM was conducted by Blissmer and McAuley (2002) in a study on physical activity. The authors randomly allocated participants to one of four conditions: a) receiving a stage matched TTM intervention, b) receiving the one of the materials as used in condition ‘a’ but mismatched to participants’ current state allocation, c) standard care, action-oriented leaflets developed by the American Heart Association and d) a control condition. The authors found that the stage matched interventions resulted in higher physical activity levels than stage mismatched and control conditions. However, the action-related standard care intervention did as well as
the stage matched intervention and this intervention did not require the additional effort of stage diagnostics and tailoring.

Quinlan and McCaul (2000) tested the effects of a stage matched (prompting participants to deliberate about quitting smoking) and a stage mismatched (action oriented intervention usually used for individuals in the preparation stage) intervention on quitting attempts amongst daily smokers in the precontemplation stage. Contrary to the assumptions in the TTM, participants receiving the mismatched intervention were more likely to make a quit attempt (Quinlan & McCaul, 2000). This is in line with evidence showing that prompting deliberation and changing attitudes (indicative for the transition through the motivational stages of the TTM) is not effective in changing behaviour. Stage matching in accordance with the TTM can therefore involve denying more effective interventions to participants (West, 2005).

A recent systematic review identified 37 randomly controlled trials designed to facilitate change in seven different health-related behaviours. (Bridle et al, 2005) The authors found limited evidence that stage-based interventions facilitated progression through stages, regardless of the type of control treatment (e.g., alternative interventions, a care intervention, or no intervention). Only six of eighteen comparisons showed greater forward movement through stages than controls, although overall, data quality was poor.

**Overall evaluation of the TTM**

As this brief review of empirical studies suggests, there is little evidence that people progress, as expected, from the first to last stage in order (Littell & Girvin, 2002), or that interventions designed for a given stage are more effective at moving people from that stage to the next than interventions which do not target stages (Aveyard et al., 2009; Herzog et al. 1999; Bridle et al. 2003; Adams & White 2005). Also, studies often use stage progress rather than actual behaviour change as dependent variables, which assume the validity of the models rather than testing it. As a result of this poor empirical record, some have called for a moratorium on research using the TTM (West, 2005; Sutton, 2005).

The Transtheoretical Model has also been subjected to a number of theoretical criticisms (Sutton, 2001). First, some stages are defined by arbitrary criteria (e.g., a specific amount of time spent in the stage), which do not seem to map onto relevant psychological processes. For example, it is not compelling that people would progress to the maintenance phase just because they have been in the action phase for 6 months. Secondly, some authors have argued that behaviour change might be better described by specifying a smaller or larger number of stages with other specifications than those postulated by the TTM. Consequently, more recent stage models use other means to define the criteria to categorize similar kinds of mindsets during the process of change, thus aiming for a stage model better supported by evidence.
Precaution Adoption Process Model

The Precaution Adoption Process Model (PAPM; Weinstein & Sandman, 1992) is a revision of the TTM, and overcomes many of the conceptual criticisms associated with it. Stage definitions are consistently based on psychological criteria rather than external factors (such as time). The PAPM aims at explaining the deliberative processes involved in making decisions about behaviour change and the translation of these decisions into action (e.g., taking a newly available vaccination). It does not aim to explain the gradual development of behaviour patterns such as diet or exercise or the adoption of risk behaviours (Weinstein, Sandman & Blalock, 2008). Defining the range of intended applications is a crucial feature of scientific theories often neglected in psychology. The authors also acknowledge that the PAPM is unfinished, a model in development. A full model explicitly proposes the stages as well as the factors promoting transition from each stage.

PAPM has seven stages (Table 2). In the beginning, people are unaware of the health issue (Stage 1). When they first learn something about the hazard, they can no longer be said to be unaware, and are starting to form opinions, but tend not to be engaged by it either (i.e., don’t really think the issue applies to them, or are not susceptible to the health problem) (Stage 2). People then reach the decision-making stage (Stage 3), having become engaged by the issue, perhaps because they have had some personal experience with it. At this point, they begin to consider their response. This decision-making process can result in one of three outcomes. First, they may suspend judgment, remaining in Stage 3 for the moment. Second, they may decide to take no action, at least for the time being (Stage 4). These people have actively decided not to act respond differently to information, become more resistant to persuasion, and may engage in actions that protect their decision/position. Third, they may decide to adopt the target behaviour, and thus move to Stage 5. Those who decide to adopt should then begin to initiate the behaviour (Stage 6). A seventh stage, if relevant, indicates that the behaviour has been maintained over time (Stage 7).

Table 2:
PAPM: Stages of Change

<table>
<thead>
<tr>
<th>STAGE</th>
<th>PSYCHOLOGICAL STATE</th>
<th>PROGRESSION/STEP</th>
<th>FACTORS OF CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unaware</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Unengaged</td>
<td>first learnings</td>
<td>Media messages about the hazard and precaution</td>
</tr>
<tr>
<td>3</td>
<td>Undecided</td>
<td>suspend judgement</td>
<td>Media messages about the hazard and precaution; Communications from</td>
</tr>
</tbody>
</table>
Since Stages 3, 4 and 5 are mutually exclusive, but all direct consequences of Stage 2, there cannot be a strict progression through these three stages; instead, the individual is hypothesized to move from Stage 2 into one of these, and if in Stage 5, then straight on to Stage 6; if Stage 3, then potentially into Stage 4 or 5 next; but if Stage 4, then the individual moves no further. This is, in fact, the primary distinction between PAPM and TTM in terms of stages (although the definitions of these stages are also different).

As with TTM, PAPM suggests that there are specific factors associated with movement from one stage to the next (see Table 2) (Weinstein, 1992). However, the authors of the theory argue these are not factors already proven to be associated with progress through stages, but rather reasonable candidates; users of the approach are invited to test these relationships and others they believe might hold true. To date, the PAPM does not specify in detail information the barriers at each stage and the critical factors to overcome these barriers (Weinstein et al., 2008). The model is thus not strictly testable, but aims at inspiring research to explain the process of adopting precautionous behaviours.

**PAPM Evidence**

PAPM has been tested less than TTM. Cross-sectional stage comparisons find that the variables that distinguish one stage from another vary depending on which two stages
are compared (Blalock, 1996; Clemow, 2000; Costanza, 2005; Sniehotta et al., 2005). These results give some support the claim that the PAPM stages are qualitatively different, so the evidence for this model is more favourable than that for TTM (even though they are very similar!). For example, in a year-long prospective study of calcium supplement intake, isolated instances of adequate calcium intake were predicted by higher levels of knowledge and perceived benefits, whereas long-term maintenance was predicted by lower levels of perceived difficulty, providing some support that individuals in different stages had different characteristics (Blalock, 2007). De Vet and colleagues (2008) found that transitions from PAPM stages for fruit intake were predicted by different variables: attitude and social influences were predictive of stage transitions amongst those deciding whether to act or not, whereas self-efficacy was predictive of the transition from decided to act to taking action.

Recently, the TTM and the PAPM have been directly compared for their ability to predict transitions in fruit intake (De Vet et al, 2007; De Vet, et al. 2008). Using a longitudinal design, a cohort of 700 adults completed questionnaires assessing fruit intake, stages of change and intention to increase fruit intake several times over a period of two months. The researchers found that PAPM better described the processes through which the individuals progressed than TTM, suggesting that a better definition of stages does produce better descriptions of the processes people actually go through.

Perhaps the strongest study to date (because it is an experimental, match-mismatch design) supports the fundamental distinction between the pre-intention vs. post intention (Weinstein et al., 1998). This study concerns testing for the presence of radon in the home environment through a single, do-it-yourself test. Radon is an invisible, odourless, radioactive gas produced by the decay of small amounts of naturally occurring uranium in soil. The home radon testing experiment focused on two stage transitions: from being undecided about testing one’s home for radon (Stage 3) to deciding to test (Stage 5), and from deciding to test (Stage 5) to ordering a test (Stage 6). People in both Stages 3 and 5 were subjected to theory-based interventions matched to their stage, or matched to the other stage in the experiment (or both interventions). Information about the local radon risk was chosen for Stage 3, while the Stage 5 interventions were designed to increase the ease of testing by providing information about do-it-yourself test kits and an actual test order form. 55% of the original sample progressed from Stage 3 by the end of the experiment (vs 19% in control group); from Stage 5 36% (vs 8% in control group). Thus, the matched treatments worked significantly better, indicating that there are psychological differences between people who are uncommitted to change, and those who are (Weinstein et al., 1998).

**Overall evaluation of the PAPM**

Based on the present evidence, the PAPM might contribute to a better understanding of the process of adopting health behaviors. The model provides a particularly useful account of the early stages of behaviour adoption in response to new health threats (e.g., radon home testing, meat consumption during a livestock epidemic, etc).
However, the model’s assumptions are less explicit than those in the TTM, so that empirical tests are less rigorous. The strongest experimental evidence from the PAPM research (Weinstein et al., 1998) supports the distinction between intenders and non-intenders. This distinction is also at the heart of the Rubicon model of action phases, discussed next.

**Rubicon model of action phases**

The major contribution of the ‘Rubicon’ model of action phases (Heckhausen, 1991) is to provide clear criteria for defining boundaries between ‘phases’ (rather than stages), by hypothesising and testing features of phase-specific mindsets. The model describes behaviour change in four consecutive phases, a preactional motivational phase, focussing on goal choice, a preactional volitional phase focussing on planning, an actional volitional phase where action performance is managed and post-actional motivation phase in which the results of one’s action are evaluated.

**Table 3:**

<table>
<thead>
<tr>
<th>MINDSET</th>
<th>CONTENT</th>
<th>SELECTIVITY</th>
<th>INFORMATION PROCESSING</th>
</tr>
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<tbody>
<tr>
<td>Motivational</td>
<td>Incentive focussed anticipation of possible consequences of behaviour (Value); Likelihood of different consequences to occur (Realisation)</td>
<td>low, open-minded reception of all available information about possible options</td>
<td>‘Reality-oriented’, unbiased by wishes and desires</td>
</tr>
<tr>
<td>Volitional</td>
<td>Focussed on realisation of intentions and plans</td>
<td>High, cognitive shielding of the intention by ignoring incongruent information</td>
<td>‘Realisation-oriented’, accompanied by optimistic bias</td>
</tr>
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</table>

The model identifies three important boundaries or transitions between phases: from general motivation to a decision/intention, to the initiation of action, and then a transition back to motivational phase during which evaluation of the action takes place. In the pre-decisional, deliberative phase, the individual is assumed to consider the likely benefits from pursuing the goal, determining what the likely benefits are, and how
much they value such benefits. They also consider the costs of changing, and whether they can achieve the goal through their own abilities (Heckhausen, 1991).

With the formation of an intention (i.e., the shift from goal setting to goal striving), the individual is postulated to move from a fluid state of contemplation (pre-decisional phase) to one of firm commitment (preactional volitional phase) – in analogy to the Roman Emperor Julius Caesar crossing the Rubicon river, and thereby committing himself to a civil war. Ideally, people in this preactional phase should develop plans which specify exactly when, where, and how goal-directed behaviour is to be performed – what Gollwitzer (1999) called ‘implementation intentions’ – which is assumed to facilitate the transition into the volitional action phase in which the goal is actively pursued. The postactional phase involves evaluating what has been achieved (using a motivational frame of mind so that the individual’s values are available) compared to the initial goal. Indeed, the individual must determine whether action can cease because the goal has been reached, and whether the hoped-for benefits were forthcoming as a result of action.

As with the other stage models, specific tasks have to be solved in each stage. In this case, making a decision, planning the execution, initiating action, and evaluating the outcome are considered to result in specific, characteristic mindsets (Gollwitzer, 1991). Cognitions in motivational and volitional mindsets are distinguished by their content (certain thoughts are more prevalent than in other mindsets), selectivity of information reception (certain information is more likely to be attended to and memorised) and information processing (information is processed with different aims in different phases).

This model has been tested in an experimental paradigm in which participants first get primed, for example by being asked to deliberate on an unsolved personal problem (deliberative mindset) or to plan the implementation of a recently set personal goal (implemental mindset). In a subsequent allegedly unrelated experiment, cognitive, self-evaluative and behavioural consequences of mindsets are assessed. There is good evidence that participants in deliberative mindsets think more about values of expected outcomes whereas participants in implemental mindsets think about when, where and how to act, and are more likely to attend to and recall stage congruent information (Heckhausen, 1991). Moreover, there is a volitional bias after forming an intention. People in preintentional stages judge desirability and feasibility impartially whereas an implemental mindset is associated with strong optimistic biases (Heckhausen & Gollwitzer, 1987).

**Overall evaluation of the Rubicon model**
The Rubicon model of action phases has not yet been subjected to the typical stage model tests outlined above, nor directly applied to health psychology. However, the key ideas of this model have become extremely influential in health psychology. Forming an intention and adopting action are the most powerful moderators in the process of
health behaviour change. Both events qualitatively change the psychological processes taking place with respect to a particular behaviour. All stage models incorporate these two transitions. In particular the Health Action Process Approach, (HAPA; Schwarzer, 2008) has been influenced by this the Rubicon model. It distinguishes between an initial, motivation phase, during which people develop an intention to act, based on beliefs about risk, outcomes, and self-efficacy, and the volition phase in which they plan the details of action, initiate action, and deal with the difficulties of carrying out that action successfully. However, the HAPA is not formulated as a strict stage model and most studies use the model to investigate the mechanisms through which people translate their intentions into action (mediators), rather than as a stage model (Schwarzer et al., 2008).

‘Intervention behaviour gap’ and solutions
The strongest evidence for qualitative psychological changes in the process of adopting new behaviour supports the distinction of pre-intentional and post intentional states (Weinstein et al., 1998; Gollwitzer, 1999; Schwarzer, 2008). While intention formation is influenced by beliefs about the value of anticipated outcomes and perceived ability to perform the target behaviour (Fishbein & Ajzen, 1975), intentions are necessary, but not sufficient conditions for behaviour change. Amongst those who form an intention, however, more than half fail to put this intention into practice. This has been described as the intention-behaviour-gap (Orbell & Sheeran, 1998).

Several approaches have been suggested to bridge this intention-behaviour gap by introducing post-intentional constructs focussing on how people pursue their goals after forming an intention. The most prominent examples are ‘implementation intentions’ specific if-then plans, who have been shown to facilitate action adoption amongst intenders (Gollwitzer, 1999; Gollwitzer & Sheeran, 2006; Sniehotta, 2009) and specific self-efficacy beliefs about capabilities to cope with impediments (‘coping self-efficacy’) or to recover from lapses (‘recovery self-efficacy’) (Schwarzer, 2008; Marlatt, 1996). These approaches are not explicitly referred to as stage models but they do share the assumptions of sequence and qualitatively different psychological processes definitive of stage approaches.

Conclusion
To date, there is no conclusive evidence that the process of behaviour change can be reliably characterized as movement through a definite series of stages which can be differentiated on psychological grounds. This may be because stages have not as yet been properly characterized (except for the basic distinction between a pre- and post-intentional phase which is strongly supported by evidence). In particular, there is little evidence to support the key claim of these approaches that treatments are more successful when applied in a stage sequence than when applied in a random sequence.
The number of stages it would be most helpful to specify, or whether a model which took a continuous change approach would better fit the data, remains to be seen (although some have argued that the existing data from TTM and other stage models is more consistent with a continuous interpretation of change than discrete stages (Sutton, 1996; Weinstein, 1998; De Vet et al, 2007).

The core principles of stage models are sequence and moderation (the importance of psychological variables and interventions depends on the progress made towards behaviour change). Some of the sequence is common-sense rather than the object of empirical tests: One cannot deliberate about using radon home tests before one has become aware of the radon risk and the possibility of testing. One cannot form an intention without some delibration. Making a plan before one decides to act seems as unlikely as unintended adoption of new preventive behaviours. The key moderators in the stage models seem to be the formulation of an intention and the adoption of actual behaviour. Future research will need to show if combining these and other moderators in an unidimensional stage model is useful.

Health psychology is thus currently left in the unresolved situation of believing that behaviour change is probably a dynamic process, but without having a well-defined and empirically confirmed approach to understanding that process. The least well formulated model (TTM) is the most used and most tested, and appears not to be very efficacious. Better-formulated models have been used less often, so it is not yet clear whether they work any better. Hopefully a theoretical breakthrough will occur in the near future, or one of the newer existing models will be shown to have substantial validity, thus remedying this situation.
Discussion points

1. What are the differences between stage models and social cognition models of behaviour change?
2. How can stage model assumptions be tested? Which tests are the most rigorous?
3. How are mindsets defined in the Rubicon model of action phases?
4. What are the differences between the TTM and the PAPM?
5. Does evidence support the TTM? Discuss the evidence.
6. How would you develop a theory-based intervention to help people stop smoking based on any of the stage models described? How would that intervention differ from those developed based on a social cognition model?
7. What is the rationale for an experimental matched-mismatched test of a stage model?

Further reading

References


