
The Transtheoretical Model and stages of change: a critique

Observations by five Commentators on the paper by Adams, J. and White, M. (2004) Why don't stage-based activity promotion interventions work?

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The Transtheoretical Model (TTM) has for some time now enjoyed fame (or even notoriety). Indeed, *Health Education Research* has been pleased to publish a number of articles over recent years. We were especially pleased to publish Adams and White's (Adams and White, 2004) interesting and arguably heretical paper which appears in this edition of the Journal (and was published in advance on our website). We felt this would be an excellent opportunity to repeat our recent venture in which we invited a Commentary Group of distinguished researchers to react to three articles on the European Smoking Prevention Framework Approach in *Health Education Research*, **18**(6), 664–677 (2003). Accordingly, we invited six equally distinguished commentators to provide a critical review of the TTM.

We are very grateful to these six colleagues for their efforts—and, of course, we thank Jean Adams and Martin White for not only agreeing to their paper being subjected to critical scrutiny, but actively encouraging debate on a subject that is partly technical and partly ideological!

Keith Tones
Executive Editor

Commentary 1

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Adams and White (Adams and White, 2004) argue that stage-based activity promotion interventions are not effective and they explain why this is the case. After reading their critique, we may want to decide to forget about stages of change and stage-targeted interventions in investigating and promoting physical activity. However, a careful reading of their paper, and a re-review of the evidence and arguments they present, shows that stage-based thinking in activity promotion may still hold some promise. In fact, their own arguments show that stage-targeted interventions do deserve another chance, despite the real and serious problems that exist in applying the stages of change construct to complex health behaviors such as physical activity. We will first briefly review Adams and White's critical analysis and introduce some additional potential problems of applying stages of change in activity promotion research. Subsequently, we will comment on the evidence the authors provide for the ineffectiveness of stage-matched activity promotion interventions and we will argue that this evidence can just as well be interpreted as supporting stage-targeted interventions. Our conclusion is that using stages of change in activity promotion is fraught with many problems, but that despite these problems, stage-based interventions have shown at least some promising results. This warrants further research to improve using stages of change in promoting complex health behavior such as physical activity.

Applying stages of change to complex health behaviors

Adams and White present three main reasons why stages of change may not be applicable to physical activity: the complexity of physical activity, the lack of validated staging algorithms and the possibility that the real determinants of activity change are not included in the Transtheoretical Model (TTM).

The complexity of behavior

Applying stages of change to complex health behaviors such as physical activity and diet is indeed beset by difficulties. Physical activity as such is not a single behavior, but a complex category of different specific actions, such as transport behaviors, work-related physical activities, home-making activities, gardening and other leisure-time activities, including sports. As Adams and White (Adams and White, 2004) argue, people may perceive very different pros, cons and hold different self-efficacy beliefs for something like going to work by bike in the morning than for working out at the gym at night. People may thus also be in different stages of change for the various specific behaviors that are often included in 'physical activity'. Additionally, this multidimensionality of physical activity may also lead to misconceptions about one's own performance. Some of our own studies have shown that many people think of themselves as complying with recommendations for complex behaviors such as low fat intake, fruit and vegetable consumption [e.g. (Lechner *et al.*, 1998; Bogers *et al.*, 2004)], as well as physical activity (Ronda *et al.*, 2001; Kremers and Brug, 2004), while their actual behavioral patterns are not in line with the recommendations. Since staging algorithms are usually based on self-assessment, these people are then regarded as being in the maintenance stage, while in fact their actions are not in line with recommended activity levels and they show no motivation to change. Such people should therefore be regarded as precontemplators (Greene *et al.*, 1999). Lechner and colleagues have argued that it might therefore be useful to distinguish between aware precontemplators (people who know they are too inactive and do not intend to change)

and unaware precontemplators (people who do not know that they are too inactive and therefore experience no need to change) (Lechner *et al.*, 1998). Further distinctions within the precontemplation stage have also been proposed for other health behaviors such as smoking (Dijkstra *et al.*, 1997; Norman *et al.*, 2000; Kremers *et al.*, 2001).

Adams and White restrict their evaluation of stages of change in activity promotion to the TTM stages of change concept. Although this is the best-known and most widely applied stages of change construct, there are other stage models that may be more appropriate since they at least take the issue of optimism in self-assessed physical activity levels into account [such as the Precaution Adoption Process phases proposed by Weinstein (Weinstein *et al.*, 1998)].

The validity of staging algorithms

Various algorithms are used to allocate people to the TTM stages of change. Since there is no 'gold standard' with which to compare different staging algorithms, the validity of these measures has not been established, and many researchers seem to feel free to adapt and change existing algorithms when they are not comfortable with the original measure. Indeed, current staging algorithms may lack validity and reliability. Recently, we conducted two studies to investigate stage stability over time for dietary behaviors in people who were not exposed to a behavior change intervention. Both studies showed that stage transitions were common, especially among people in contemplation and preparation, even within as short a time interval as 3 days (de Nooijer *et al.*, 2005b; de Vet *et al.*, 2005). Such stage instabilities can of course reflect true stage transitions, but may also indicate low test-re-test reliability of the staging algorithm. A non-reliable staging tool and true stage instability will both result in mismatching of stage-based interventions.

Most of the staging algorithms are solely based on self-assessed behavior and motivation: respondents are asked whether they think that they are complying with a recommended activity level (action) and, if so, whether they have done so for a longer period of time (maintenance). If not, they

are asked whether they intend to change to a more active lifestyle in the longer run (contemplation) or in the short term (preparation). People who think they do not comply with the recommended level of activity and are not motivated to change are allocated to the precontemplation stage. One of the main problems with this approach is the aforementioned issue of misconception of personal levels of activity. Greene and colleagues, as well as others, have argued that for complex health behaviors a more objective assessment of behavior should be included in the algorithm (Greene *et al.*, 1999; Ronda *et al.*, 2001). Since measuring the usual physical activity patterns is difficult, as well as a potential burden on the respondents, including such more objective behavior assessments makes stage allocation much harder. The stages of change approach then loses much of its attractiveness as an easy way to distinguish different target groups for interventions. However, such a more objective and thus comprehensive measurement of behavior can and has been applied in individually tailored interventions (Kreuter and Skinner, 2000).

There are new and promising developments in the field of adapting the staging algorithms that are currently in use. Godin *et al.* (Godin *et al.*, 2004), for example, showed that a staging algorithm for physical activity, based on a 2×2 matrix of intention and recent past behavior, outperformed the TTM stages of change algorithm in terms of cross-sectional differences between stages in attitudes and perceived behavioral control.

The real determinants of changing physical activities

Adams and White restrict their view to the stages of change proposed in the TTM. This model posits that decisional balance, self-efficacy and processes of change are the most important stage transition determinants. The evidence for the importance of these constructs is mostly based on cross-sectional data and more convincing evidence based on longitudinal data or experimental research is mostly lacking (Sutton, 2000; de Vet *et al.*, 2005). Developing interventions that are indeed stage-matched requires knowledge about important and

modifiable stage transition determinants. Alternative stage-transition determinants can be derived from behavior change research that is not solely based on determinants put forward by the TTM. For example, computer-tailoring studies have found that behavior feedback resulted in better awareness of personal behavior and a greater intention to change (de Bourdeaudhuij and Brug, 2000; Oenema *et al.*, 2001; Vandelandotte *et al.*, 2005), in line with predictions derived from stages of change as proposed in the Precaution Adoption Process Model (Weinstein *et al.*, 1998). Schwarzer and Renner (Schwarzer and Renner, 2000) proposed that different self-efficacy constructs are relevant for transitions to motivation (contemplation) and action. Implementation intention research shows that making specific action plans may help people to turn their intentions into health promoting action (Gollwitzer, 1999). Social marketing and ecological models of health behavior change posit that educational interventions may help to improve motivation to change, but that better opportunities for healthy behavior are needed to move people to action (Rothschild, 1999; Baranowski *et al.*, 2003).

Are stage-targeted interventions ineffective?

Adams and White start their paper with a summary of what they see as the lack of evidence for the effectiveness of stage-targeted activity promotion interventions. Their main arguments are that stage-targeted interventions are not superior to non-staged interventions in inducing longer-term behavior change. However, they do agree that stage-targeted interventions appear to be more likely to induce short-term behavior change, and to induce changes in motivation and other potential mediators of change.

No long-term effects

In order for physical activity promotion to have a public health impact, the effects should be long lasting and most activity promotion stage-matched interventions do not show longer-term effects. Stage-targeted activity promotion interventions, like most interventions (including non stage-matched

ones), are almost all short-term interventions and are mostly restricted to educational strategies. One cannot expect long-term effects from such short-term interventions, whether stage-matched or not. Effective short-term interventions are likely to lead to short-term effects only. Physical activity habits have been acquired over a long period of time and longer lasting as well as more comprehensive interventions, i.e. interventions that include education, facilitation as well as possibly legislation, are probably needed to break such long-lasting unhealthy habits more definitively (Rothschild, 1999; Baranowski *et al.*, 2003). However, long-term behavior change requires that at least behavior change should be induced: initial change is an important, although not sufficient, condition for long-term change to occur. Thus, if short-term stage-targeted interventions are better able to induce short-term behavior change than short-term generic interventions, this is evidence in favor of stage targeting.

Stage progression is not the same as behavior change

Adams and White further argue that although stage-matched interventions may induce stage progression, this is not always followed by actual behavior change. Although stage progression may indeed not necessarily lead to a change in behavior, improved motivation or stronger intentions, i.e. progression within the early stages of change, it is again an important, though not sufficient condition for behavior change. Sheeran (Sheeran, 2002) showed that lack of intention almost certainly leads to lack of behavior, while a positive intention is important, although no guarantee, for behavior. Thus, stage progression within early stages of change is important to improve the likelihood of subsequent changes in behavior. In terms of the evaluation of health promotion interventions, stage progression within the early stages of change can be viewed as an intermediate outcome of success (Tones, 1998).

That stage-targeted activity promotion interventions are more likely to effect changes in motivation as well as short-term behavior change indicates that interventions that try to better match people's motivation and self-assessed behavior are superior

to those that do not take these factors into account. It does, however, not prove the validity of distinguishing five discrete stages of change, rather than, for example, more stages or a more continuous progression from lack of motivation to sustained action (Sutton, 2000). Individualized health education interventions that go beyond stage targeting, which are referred to as tailored interventions (Kreuter and Skinner, 2000), may be better suited to induce changes in complex behaviors than mere stage matching, since such interventions provide people with personalized feedback and advice that directly matches their individual behavior, motivation, perceived pros and cons, and self-efficacy beliefs (Brug *et al.*, 2003).

Conclusions

Adams and White are right to argue that the validity of the TTM has not been established for complex health behaviors and that the application of the TTM stages of change in physical activity promotion comes with all sorts of problems. There is no consensus on the best way to allocate people to stages of change and the evidence for the stage-transition determinants proposed by TTM is not very strong. Nevertheless, stage-targeted activity promotion interventions are more likely to induce changes in motivation as well as short-term behavior changes. This warrants further research to improve the stages of change construct, to test potential adaptations, to identify important and modifiable stage-transition determinants (de Vet *et al.*, 2004), and to develop and evaluate interventions that target these determinants (Weinstein *et al.*, 1998). More generally, effective longer-term physical activity promotion requires longer-lasting interventions that may need to go beyond health education, incorporating environmental change strategies to improve opportunities for physical activity.

Commentary 2

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A number of researchers have suggested that there may be qualitatively different stages in the initiation and maintenance of health behaviors such as physical activity, and that to obtain a full understanding of the determinants of health behavior it is necessary to conduct a detailed analysis of the nature of these stages [see (Sutton, 2005) for a review]. Adams and White (Adams and White, 2003) review the Transtheoretical Model (TTM) of behavior change (Prochaska and DiClemente, 1984) and two recent reviews of stage-based interventions as applied to physical activity promotion. As these reviews failed to find strong support for such interventions, Adams and White (Adams and White, 2004) go on to offer a number of reasons for the lack of effectiveness of stage-based activity interventions. The identified reasons are persuasive, but ignore a more basic reason: the validity of stages identified in the TTM. This commentary focuses on the validity of the stages and the nature of evidence that might be used to support a stage model such as the TTM.

One of the first stage models was put forward by Prochaska and DiClemente (Prochaska and DiClemente, 1984) in their TTM. Their model has been widely applied to analyze the process of change in a range of areas including physical activity promotion. In one recent form, DiClemente *et al.* (DiClemente *et al.*, 1991) identify five stages of change: precontemplation, contemplation, preparation, action and maintenance. Individuals are seen to progress through each stage to achieve successful maintenance of a new behavior. Taking the example of smoking cessation, it is argued that in the precontemplation stage the smoker is unaware that his/her behavior constitutes a problem and has no intention to quit. In the contemplation stage, the smoker starts to think about changing his/her behavior, but is not committed to try to quit. In the preparation stage, the smoker has an intention to quit and starts to make plans about how to quit. The action stage is characterized by active attempts to quit, and after 6 months of successful abstinence the individual moves into the maintenance stage characterized by attempts to prevent relapse and to consolidate the newly acquired non-smoking status.

There are a number of other components to the TTM, such as the processes of change, but these are not commented on here.

It is worth noting that there are a number of other stage models [see (Armitage and Conner, 2000) for a review], although they have tended to be less widely applied than the TTM. These other stage models include the Health Action Process Approach (Schwarzer, 1992), the Precaution Adoption Process Model (Weinstein, 1988), Goal Achievement Theory (Bagozzi, 1992) and the Model of Action Phases (Gollwitzer, 1990; Heckhausen, 1991). There are two important themes common to these stage models. First, they emphasize a temporal perspective with different stages of behavior change. While the models postulate different numbers of stages, they all follow the same pattern from a precontemplation stage through a motivation stage to the initiation and maintenance of behavior. The important point is that these models are dynamic in nature; people move from one stage to another over time. Second, these stage models imply that different cognitions are important at different stages and so can constitute important foci for interventions (Sandman and Weinstein, 1993). For example, in the earlier stages information may be processed about the costs and benefits of performing a behavior, while in the later stages cognitions become more focused on the development of plans of action to initiate and support the maintenance of a behavior. This earlier motivational phase is assumed to end with the formation of an intention and only when the level of motivation or intention reaches a particular level is the individual assumed to be likely to move on to later stages. Some argue that the distinction between a motivational and volitional stage is the key contribution of stage models (Armitage and Conner, 2000). This second theme forms the basis for a number of stage-based interventions which try to achieve behavior change through targeting those in different stages with different interventions.

Whilst models such as the TTM have been relative widely applied, the evidence in support of stage models and the different stages distinguished is at present relatively weak [see (Weinstein *et al.*,

1998; Bridle *et al.*, 2005; Sutton, 2005)]. Such evidence can take a variety of forms from relatively weak evidence such as that of discontinuity patterns across the stages in change (e.g. in self-efficacy) to relatively strong evidence such as showing the superiority of stage-matched compared to stage-mismatched interventions. Across behavioral domains the evidence supporting the TTM tends to become less consistent as the tests become stronger (Armitage and Conner, 2000; Sutton, 2005).

Adams and White (Adams and White, 2004) focus on evaluation of stage-matched interventions for physical activity promotion. This is one of the most important avenues for research into the TTM, both because it represents a strong test of the model and because it represents one of the important appeals of the TTM (i.e. that a targeted intervention will produce greater behavior change). Stage-matched interventions are probably better described as targeted rather than individualized (or tailored) interventions [the term favored by (Adams and White, 2004)]. This distinction has been highlighted by Kreuter and Skinner (Kreuter and Skinner, 2000). On the one hand, *targeted* interventions are regarded as those that have been designed 'for a defined population subgroup that takes into account characteristics shared by the subgroup's members' [(Kreuter and Skinner, 2000), p. 1]. In contrast, tailored interventions are '*intended to reach one specific person, based on characteristics unique to that person...derived from an individual assessment*' [(Kreuter and Skinner, 2000), p. 1]. This distinction is important because while evidence of the effectiveness of stage-matched interventions may have some importance in general evaluations of targeted interventions, such evidence has little or no relevance to evaluations of tailored interventions. The evidence reviewed by Adams and White (Adams and White, 2004) indicated that stage-based interventions for promoting physical activity were more effective than control conditions in between 43% (Riemsma *et al.*, 2002) and 73% (Adams and White, 2003) of tests. However, this effectiveness dropped to 29% in the studies examining behavior change for periods of greater than 6 months (Adams and White, 2003). This represents

only modest evidence that stage-matched interventions are more effective in producing short-term physical activity change and even weaker evidence in relation to long-term physical activity change. As noted earlier, such evidence is also weaker than a comparison of stage-matched and stage-mismatched intervention that appears to be lacking in this area. The evidence in relation to physical activity change appears to mirror that in other areas (Sutton, 2005) where stronger tests appear to produce weaker support for the TTM.

Adams and White (Adams and White, 2004) offer five reasons why stage-based interventions to promote physical activity may not work. These reasons are at a general level and more specific reasons may apply to understanding the ineffectiveness of specific interventions [e.g. failure to change targeted cognitions; see (Norman and Conner, 2005)]. A further general reason may be the validity of the stages identified in the TTM. Adams and White (Adams and White, 2004) note the problems in appropriately classifying individuals into stages based on existing algorithms. This may in part be attributable to the validity of the stages identified. In the TTM the stages are distinguished based on plans or intentions to act, whether behavior has been performed and length of time the behavior is performed. The latter criterion is used to distinguish action and maintenance, but is essentially arbitrary. Other stage models distinguish different numbers of stages or use different criteria. Most consensus across models focuses on the criterion of whether behavior has been performed or not. Armitage and Conner (Armitage and Conner, 2000) suggest that this criterion is key in differentiating motivational (pre-behavior initiation) from volitional (post-behavior initiation) influences. Evidence supporting a distinction between initiation and maintenance of a behavior is growing, although how best to distinguish the two remains an issue of debate (Rothman, 2000). The problem of appropriately classifying individuals into stage as noted by Adams and White (Adams and White, 2004) may be part of a more general problem of the validity of the stages identified in the TTM.

Commentary 3

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My commentary focuses on two related issues. The first is whether or not it is reasonable to judge Transtheoretical Model (TTM) interventions designed to promote physical activity on their long-term effectiveness. Adams and White (Adams and White, 2004) imply it is and I question this. The second is if the TTM accurately captures the complex relationship between people's mental constructs and how they behave, particularly in relation to exercise. Adams and White suggest it does not and I tend to agree, although for slightly different reasons.

In their paper, Adams and White claim:

There is, therefore, substantial reason to believe that stage-based activity promotion interventions, which have been evaluated to date, are not more effective than control conditions in promoting long-term adherence to increased activity levels.

The evidence they cite suggests that this may be true, but is this claim fair? The stage-based interventions to promote physical activity that they describe involve motivating individuals to become more active or working with them on strategies to integrate physical activity into their lives. I think it is important to be clear about what we can reasonably expect from interventions of this type.

We are all exposed to multiple persuasive messages every day that encourage us to behave in particular ways. Health promotion interventions are just one such message. To work, health promotion interventions, just like commercial advertising campaigns, cannot rely on one strategy over a single period of time to get people behaving as they would like forever. People have to be kept interested and most of all constantly reminded of why they should do what you think is good for them. TTM-based interventions may sometimes achieve their goal of getting people to a new 'stage' in integrating

physical activity into their lives. However, as the active phase of the intervention recedes into the distance, other social forces may regain their power and gradually erode the progress an individual has made. A failure to produce long-term change is not necessarily a failure on the part of the TTM, as is also pointed out by Brug and Kremers in their Commentary. Rather, it illustrates the need for prevention programmes to use a variety of strategies and to never let up. The high rates of inactivity noted by Adams and White indicate that there are features within our built and social environments which encourage us not to be active. No individually based 'psychological' intervention can possibly be expected to counteract the pull of these forces on most people for long.

Interestingly, Adams and White acknowledge that strategies like stage-based change interventions cannot be complete solutions, when they note under the heading 'Why don't stage-based interventions to promote physical activity work' that 'exercise behavior is influenced by numerous external factors not considered by the TTM'. They, however, frame this as a problem for the model itself, rather than suggesting as I have that this emphasizes the need to look for complementary strategies if practitioners are considering TTM as part of a comprehensive plan to increase physical activity.

So, if we reduce our expectations in line with what we can reasonably expect, do interventions using the TTM show promise? Based on the evidence provided by Adams and White's (Adams and White, 2003) earlier review, they do, as most of the TTM-based interventions they analyzed were effective in promoting the adoption of physical activity in the short term.

The second issue I would like to take up concerns the relationship between exercise psychology and exercise behavior. One of the criticisms that Adams and White make of the TTM is that 'the model suggests stage progression is a significant outcome, but this is not always associated with behavior change'. They also comment that 'the TTM suggests that the psychological alterations that occur alongside stage progression will necessarily lead to behavior change in the future'. The relationship

between people's attitudes and their behavior is an issue that has plagued social psychology and health promotion for many decades. It is certainly the case, that a more positive attitude towards a particular behavior does not invariably lead to its adoption [e.g. (Ajzen and Fishbein, 1980)]. However, it is also the case that people's intentional, everyday behavior is largely a product of their psychological schemas about themselves and the world [see (Harré, 2005) for further discussion of this]. Given the highly intentional nature of exercising, people who are physically active will have an accompanying psychological schema that is central to the maintenance of this behavior.

Whether or not it is reasonable for evaluations of interventions using the TTM to measure psychological changes and suggest that these are of value depends on a number of things. First, how accurately the model describes the psychological schemas that underlie physical activity. Second, whether there actually are standard psychological correlates of physical activity. Third, whether people, or at least enough people, progress through 'stages' in becoming committed to regular exercise, in particular the stages identified by the TTM.

In a critique of the TTM published in this Journal in 2000, Whitelaw *et al.* (Whitelaw *et al.*, 2000) raised a number of points that suggest there are substantial problems with the TTM as a model of psychological and behavior change. In particular, they drew attention to studies that challenge the TTM's outline of psychological stages and suggested there is little supporting evidence for the model, despite its intuitive appeal. Given the complex and unique network of experiences, hopes, fears, attachments and obligations that motivate people and create the psychological schemas that inform their activities, a model which attempts to come up with a set of common psychological correlates that maintain a particular behavior is going to be problematic. A model which also suggests people move through a series of fixed stages to arrive at these psychological correlates is going to be doubly problematic. Perhaps the TTM is triply problematic when applied to physical activity as exercise behavior itself is not just one behavior.

(This is pointed out by Adams and White. I do wonder, however, if anything is really 'one' behavior. Even something like smoking might be classified as 'habitual smoking' or 'smoking to show off to friends' or 'smoking as pleasure', etc. In a sense, my point is just this, that behaviors are as complex and unique as the psychological schemas that maintain them.)

Whether or not the TTM is so problematic that it should be abandoned as a basis for physical activity interventions is very difficult to determine. Even Adams and White appear reluctant to condemn it completely, by suggesting an elaborate process by which the validity of each stage and the assumptions about how to progress people from one stage to the next could be measured. Further, as I have already pointed out, their earlier review (Adams and White, 2003) does suggest that TTM-based interventions can result in short-term increases in physical activity. Perhaps we should be focusing more on trying to extract what the TTM offers that is of value to practitioners, rather than whether it really captures the essential features behind the decision to engage in and then maintain physical activity. Although it maybe rather hit and miss when it comes to the latter, there is obviously something about it that works, at least for some people some of the time.

Commentary 4

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Adams and White (Adams and White, 2004) have produced a well-organized examination of various possibilities posited to explain why interventions to promote physical activity based on the Transtheoretical Model (TTM) do not seem to be very successful. If we were to accept the premise that such interventions should be expected to work, then several of Adams and White's suggestions might seem persuasive. For example, the proposition that exercise may not be one single behavior and thus not

a suitable focus for stage-based interventions is not only intuitively believable, but has also been supported by a number of studies. Like the Finnish work referred to by Adams and White, a Swiss study concluded that individuals could be in different stages of change depending on whether moderate or vigorous physical activity was the focus (Martin-Diener, 2004), while research carried out in Germany by Schumann *et al.* found that the stage of change could not be distinguished in individuals taking part in mild exercise, in spite of the fact that such activity can also convey health benefits (Schumann *et al.*, 2003).

Another possibility proposed by Adams and White concerns the lack of an agreed system for allocating individuals to the appropriate stage; this issue, which is clearly fundamental to any examination of the model and its effectiveness, has also been identified by other commentators [e.g. (Whitelaw *et al.*, 2000, Davidson, 2001, Ma *et al.*, 2003; Marttila *et al.*, 2003)].

However, rather than consider the merits of the explanations put forward by Adams and White to explain why stage-based interventions to promote physical activity do not work, the more fundamental question might be: why would we think that they *should* work? The TTM has been the subject of a considerable amount of controversy. Whitelaw *et al.* pointed out the inconsistency of much of the evidence base claimed for the model and expressed reservations about the tendency among some investigators to accept the value of the model on intuitive grounds alone (Whitelaw *et al.*, 2000). Davidson has also emphasized the lack of evidence for the effectiveness of the model and has suggested that ‘the segments of the cycle are probably not distinct stages but artificial markers on a motivational continuum’ [(Davidson, 2001), p. 24].

How convincing is the idea that the model incorporates distinct stages? The first two stages, precontemplation and contemplation, involve differences in intention, while the remaining stages reflect changes in the frequency or duration of the desired behavior; these latter stages are based on arbitrary categorizations rather than true differences and leave the model vulnerable to the allegation that

movement between some stages (action and maintenance) can be effected by the passage of time alone (Bandura, 1997; Davidson, 2001).

Moreover, a considerable amount of the research carried out on the TTM has been cross-sectional in nature, examining the variation across stages of variables such as decisional balance and self-efficacy. Although differences in these variables between stages have regularly been reported, such cross-sectional work does not really demonstrate the predictive power of these variables nor, in fact, whether distinct stages truly exist or whether there is instead an underlying continuum.

Little of the research in this area has looked at desired outcomes in terms of behavior. In particular, in the eyes of many commentators the success of stage-matched interventions has not been satisfactorily proved: ‘Specifically with regard to the model’s most popular and innovative prediction—that people in different stages require different interventions—remarkably few critical tests have been conducted’ [(Dijkstra *et al.*, 2003, p. 424), while the same prediction, according to Davidson, ‘remains an article of faith’ [(Davidson, 2001), p. 24]. van Sluijs *et al.* carried out a recent review of the literature relating to the application of the TTM to lifestyle behavior and concluded that there was only limited evidence for the effectiveness of stage-based lifestyle interventions (van Sluijs *et al.*, 2004).

Where behaviors such as physical activity and diet are the focus, the TTM could be said to be particularly inappropriate. In so-called addictive behaviors such as smoking, the target of behavior change is very easy to recognize; however, when the desired behavior is ‘healthy eating’ or ‘regular exercise’, the goal is much more nebulous, hard to define and open to subjective interpretation on the part of those making the change.

Interesting as it may be to describe the processes involved in behavior change, the case for the efficacy of stage-specific interventions does not seem to have been conclusively made. In spite of all the interest the TTM has engendered over more than two decades, many commentators would still agree with Bandura that ‘human functioning is simply too multifaceted and multidetermined to be

categorized into a few discrete stages' [(Bandura, 1997), p. 8].

Commentary 5

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I was fortunate enough to act as a reviewer of Adams and White's (Adams and White, 2004) paper when first submitted to *Health Education Research*. I felt it possessed two valuable features. First, it provided a significant contribution to the small but growing number of critical effectiveness reviews of the Transtheoretical Model (TTM). In particular, it highlighted the problematic relationship between stage progression and behavioral outcomes. Second, it provided a helpful examination of the validity of the model within the context of a specific type of behavior with particular features. This acted as a balance to what I consider to be the uncritical colonization of various behavioral areas by TTM.

Support of these essentially 'pro-skeptical' opinions did not spring from a vacuum. I initially came across TTM whilst working in a community service for problem heroin users in 1987. The model seemed incredibly simple, powerful, discerning and practically useful to frontline drugs workers dealing with 'revolving door' clients whose drug using 'lapses' had traditionally been seen as 'failures'. The need for services to maintain contact with injecting users in the context of fear of an HIV epidemic provide added incentive. Thus, the model seemed to *fit* the times or, as Robin Davidson put it, 'caught the current mood' [(Davidson, 1992), p. 821]. Subsequently, I introduced the model to students within a Masters level programme in behavior change and was continually struck by the enthusiasm it generated; it appeared to have an intuitive attractiveness.

In 1999, I commissioned a review of the model on behalf of the Health Education Board for Scotland (HEBS) undertaken by Robin Bunton, the late Steve Baldwin and Darren Flynn (Health Education Board for Scotland, 1999) that subsequently

produced two published papers (Bunton *et al.*, 2000; Whitelaw *et al.*, 2000). This work flagged up many of the physical activity specific issues confirmed by Adams and White, i.e. the relative paucity of affirmative evidence, the weakness of evaluative designs and the existence of conceptual inconsistencies in the structure of the model. As such, this exercise provided a powerful objective test of my previously (subjective) affirmative views and contributed to the general resonance I have with most of Adam and White's conclusions.

However, I feel that a difficult issue is raised towards the conclusion of the paper where Adams and White attempt to find a constructive way out of their essentially skeptical prior narrative; they propose that, 'its is unclear whether any investigators, to date, have managed to develop and evaluate a *truly* [italics added] staged intervention', then call for a disaggregating of the five elements of the model wherein 'each stage specific intervention is trailed against control conditions in the target group'. To me, this proposed way forward strikes at the heart of what are at this point in time crucial question(s) relating to the basis of the model and the associated matter of how we evaluate it; 'what is TTM' and as such 'how do we understand, assess and deploy it'?

In relation to its ontological status, in suggesting a comparatively formal approach to evaluation based on the assumption of a 'true' model, Adams and White appear to be advocating a relatively conservative approach (and one that is perhaps slightly in contradiction to their prior critical narrative). I suggest that this answer is problematic for both functional and conceptual reasons.

First, based on the state of the current literature base, there is little to suggest that going further down this traditional road will resolve any of the tensions that Adams and White so usefully identify. Even the most cursory examinations of the TTM evidence literature shows a situation of utter confusion and entrenched disputes. Here is a small sample:

- At a conceptual level Bandura says TTM is not a true stage model, Prochaska and Velicer say it is (Prochaska and Velicer, 1997).

- Aveyard *et al.*'s evaluation of the highly publicized young peoples' smoking-oriented *Pro Change* programme suggests that it 'had no effect on smoking prevalence among participants' [(Aveyard *et al.*, 1999), p. 953], but Prochaska contests these findings at a technical level on the basis that an adult dosage was applied to young people by Aveyard, whilst in the mainstream media Boseley (Boseley, 1999) cites smoking quit rates of 'between 25 and 27%' associated with *Pro Change* and concludes that it 'has shown to the horror of the counselors that the computer is more effective than they are' [(Boseley, 1999), p. 5].
- In meta reviews, Riemsma *et al.* (Riemsma *et al.*, 2002, 2003) in their systematic review for the UK Health Technology Assessment initiative conclude, 'limited evidence exists for the effectiveness of stage based interventions', but Prochaska (Prochaska, 2003) disagrees citing the affirmative views contained within Spencer *et al.*'s 2002 review (Spencer *et al.*, 2002).

I could go on. But it now feels to me that we have reached an impasse; a gridlock where, working within restricted academic parameters, specific groups and individuals respectively re-cycle supportive and critical data associated with the model or argue about meaningless conceptual or methodological minutiae.

Second, in conceptual terms, I think that the realist assumptions frequently associated with the model propagated by many in the TTM field (and apparently supported here by Adams and White) then embodied in the majority of evaluative approaches to TTM is flawed in that it assumes that TTM is a cognitive *reality*. To my mind, enquiry around TTM via population data, numerical outcomes and structured experimental designs can only be predicated on the existence of a relatively precise, stable and generalizable ontological base. However, there is little to suggest that such constancy exists within TTM. In what could be considered the self-evident context of what Reiter (Reiter, 2001) calls 'the incredible complexity of human beings' many threats to internal validity continually surface: the

inconsistent nature of stages, doubts about the cyclical process of change, and imprecise accounts of the relationship between stages and processes. In this sense, McKellar's rhetorical question in her Commentary above, 'why would we think that they [TTM based interventions] *should* work?', has a profound resonance. Quite simply the evidence of effectiveness is equivocal because there can never really be a single true account of TTM upon which evaluative work can be built.

So if TTM is not a psychological reality, then what is it? I suggest that rather than existing as a rigid empirical entity in individuals' heads, TTM should be considered as a more loosely constructed object whose roots lie in a wider social and cultural context. In this sense, the existence of cycles and stages in TTM (expressed as a 'natural' element of individuals' consciousness?) are reflections of our deep pre-occupation with the circle (e.g. the current popular fascination with *pi*) and whose source is a deep pool of *collective* consciousness that is fashioned by influences from various sources, e.g. cycles in music, poetry and novels (Midgely, 2001). More specifically, the notion of cycles has been transposed from traditional biological, ecological and astronomical contexts into various disciplinary areas, e.g. cycles of history, economic cycles, cycles of organizational change, policy cycles, etc. Likewise, the suggestion that processes occur in stages is long and firmly established in relation to many conditions (e.g. post-traumatic stress and bereavement) and has even been embodied in the most profound of our cultural mediators *The Simpsons* when Homer hears he has only 24 hours to live after eating a poisonous fish at his local sushi restaurant:

Dr Hibbert Now, a little death anxiety is normal. You can expect to go through five stages. The first is denial.
Homer No way! Because I'm not dying!
Dr Hibbert The second is anger.
Homer Why you little! [Steps towards Dr Hibbert]
Dr Hibbert After that comes fear.
Homer What's after fear? What's after fear? [In frightened voice]

- Dr Hibbert Bargaining.
 Homer Doc, you gotta get me out of this! I'll make it worth your while!
 Dr Hibbert Finally, acceptance.
 Homer Well, we all gotta go sometime.
 Dr Hibbert Mr Simpson, your progress astounds me.

It could be argued that TTM and the various other stage-based models that other Commentators have interestingly cited above (e.g. Conner, Brug and Kremer) is simply trying to suggest or portray psychological and behavioral 'movement' in the form of a metaphor or symbol. In this sense, the notion of cycles and stages of change are simply archetypes or iconic attempts at constructing potential processes of change. Given the cultural ubiquitousness of these notions, it is hardly surprising that they should be utilized. As such, the cyclical and stage based essence of TTM can never be outrightly refuted. However, their specific status can.

First, this transformation of vague ideas into specific TTM realities could be seen as a case of good old-fashioned reification—the translation of an abstract concept into a material thing. This to me is problematic—in contrast to the scientific precision sought and suggested by many, the TTM map must be seen as relatively loose and fuzzy. Second, it should not be seen as the *only* construction of a process of psychological and behavioral movement. Various other cultural metaphors could equally be seen as useful, e.g. in linear forms of 'before and after' (e.g. Ajzen and Fishbein's Theory of Reasoned Action or Tones' Health Action Model); the balances of a static grid (e.g. Becker's Health Belief Model); the interactive *flow* that contains both forward (progressive) and backward (resistive) movements as suggested by dynamics 'tidal' (Barker's Tidal Model) and Freud's idea of floods and dams [cited in (Frosh, 1991)]; and, finally, the 'pendulum' notion of change as a process occurring between two fixed points (Jebara, 1998).

So, to me, TTM is not the product of a purely empirical or scientific exercise, but rather the culturally constructed central feature of a wider

social and cultural movement or phenomenon. In this context a number of broader observations realized during the conducting and disseminating of the HEBS review described above particularly shaped my views. First, those supportive of the model appear to do so with a particular *passion*, e.g. Stockwell describes how a participant at a TTM training event had likened the experience to 'an evangelical religious meeting' [(Stockwell, 1992), p. 831], and goes on to use the terms 'revelation' and 'conversion experience' to describe his and others initiation. Second, this support seems to come *a priori* and be all-encompassing, resulting in a tendency not to want to engage significantly in constructive dialogue with critical views. For example, at a national dissemination conference for the HEBS work in Glasgow in the summer of 1999 where practitioners, trainers and researchers were generally hostile to some of the (what appeared to us to be) mildly yet largely constructive critical observations. We would naturally have expected discussion and potential dissent, but such was the intensity of the response that we were left with the impression that what had been critiqued was a sacred orthodoxy rather than simply a psychological model. Third, TTM is actively sold as beneficial. Introductory sections of papers repeatedly construct a rationale and context for the use of TTM, i.e. there are specific behaviorally based health problems, these are serious (graphic expressions of the scale and levels of morbidity and mortality associated with them), their solution is based on the need to change individual behavior, other approaches have been unsuccessful in bringing out this change, TTM has been shown to be effective and that this effectiveness is displayed in a range of topic areas. This tendency has extended to a more active marketing of the model as a remedy for a whole host of health problems and reached an apotheosis with Sarah Boseley's 1999 article 'The man who shrinks the kids' in the UK national broadsheet *The Guardian* (Boseley, 1999). The article included an interview with James Prochaska on the model (accompanied by a large picture of a fittingly benevolent looking Prochaska) as well as an account of a TTM-based young people's smoking

project described earlier in a particularly deprived area of Northern England. In it, gloomy accounts of the Derbyshire mining village of Shirebrook are counter-posed with the image of the ‘guru of behavior change’ James Prochaska, ‘three thousand miles away’ wearing ‘flip-flops and khaki shorts around the office’ and surrounded by ‘his enthusiastic young devotees’. Those in the UK who have adapted TTM have adopted the model within a CD-Rom-based *Pro Change* smoking package are deemed to be ‘visionary health educationalists’ and are portrayed as mounting a ‘crusade against teenage smoking’ with ‘missionary zeal’.

So, where does this leave us? Adams and White’s paper is I believe important in a number of respects. At the level of evidence, it exists alongside other recent publications as a balance to what I have perceived as a drift towards seeing or attempting to actively sell TTM as *the* practical magic pill or more broadly a sacrosanct ideology. At a structural level it also critically challenges the overly generalized nature of TTM in the context of the complexity of physical activity behavior. I am less convinced of Adams and White proposals for resolving these issues. Their belief in a relatively conservative ‘realistic’ assessment of TTM along with subsequent suggestions from commentators (e.g. the use of other stage-based models or adapted staging algorithms that are potentially better at stage classification; see Commentaries by Conner, Brug and Kremers) is clearly one (albeit relatively limited) way of progressing.

However, I am not convinced of the utility of this exercise. I would suggest that we sidestep what appears to me to be the latent futility involved in further refining the basis of the model and assessing competing truth claims of whether TTM ‘works’ or not, and attempt to operate in a more expansive terrain that includes the following: a more detailed consideration of *what* the intervention *is* (an ontological analysis) that deals not only in surface descriptions, but also pursues an examination of the cultural and social forces that have led to the construction of the elements of the model; an examination of the various processes by which the interventions are delivered or implemented,

including as Brug and Kremers suggest in their Commentary, achieving a notion of how TTM-based activity relates to other elements of a comprehensive intervention; and relatedly as Harré has implied in her Commentary, achieving a consensus within a range of protagonists on the types of (intermediate) impacts we can realistically expect in of themselves from TTM-based interventions.

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